GRAPHICS ISSUE

FOR APPLE II USERS COMPUTING

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JUNE/JULY 1986

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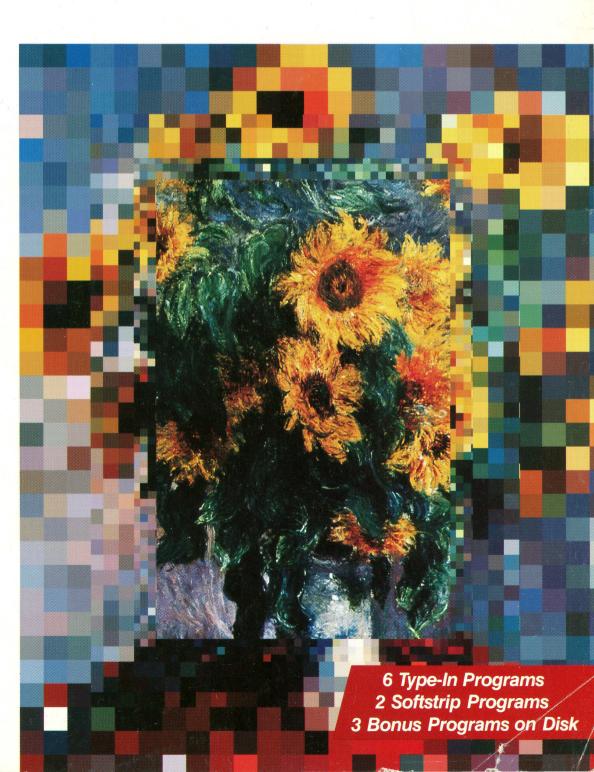
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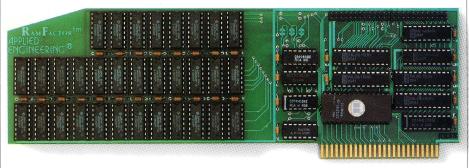


RamFactor

All the Performance, Speed, and Software Compatibility of RamWorks™ in a Slot 1 through 7 Card.

That's right! Now Applied Engineering offers you a choice. While RamWorks is the clear winner for the auxiliary slot in a IIe, RamFactor is the standard for slots 1 through 7. Now anyone with an Apple II+, Franklin, or Apple IIe preferring to use slots 1 through 7 can now enjoy the speed and performance that until now was only available with RamWorks.

With RamFactor, you'll be able to instantly add another 256K, 512K, or a full 1 meg on the main board and up to 16 meg with additional piggyback card. And since virtually all software is automatically compatible with RamFactor, you'll immediately be able to load programs into RamFactor for instantaneous access to information. You'll also be able to store more data for larger word processing documents, bigger data bases, and expanded spreadsheets.



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All the leading software is already compatible with RamFactor. Programs like Apple-Works, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, Mouse-Write, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other memory card (RamWorks excepted) is more compatible with commercial software.

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There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 51/4", 31/2", and hard disks. All this performance is available to anyone with an Apple IIe or II+ with an 80 column card.

RamFactor, <u>no</u> other standard slot card comes close to enhancing AppleWorks so much.

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RamFactor has a built-in 65C816 CPU port for direct connection to our IIe 65C816 card for linearly addressing up to 16 meg for the most powerful 16 bit applications. (II+65C816 card under development.)

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- Automatic expansion with AppleWorks 1.3 or later
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- Displays time and date on the AppleWorks screen with any ProDos clock
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PINPOINT AppleWorks Desktop Accessories/Pinpoint Spelling Checker ◀

Computer Systems:

Apple IIc Enhanced Apple IIe with 128K

Apple IIe with Pinpoint Apple IIe Upgrade Kit Franklin 2000'

Video Technologies, Laser 128

PINPOINT IS FOR YOU

Whether you're one of over 800,000 satisfied AppleWorks users, own a RAM card, high-capacity disk drive, accelerator card or high-speed modem, or just need to get more work done every day, PINPOINT's Desktop Accessories are

This product information report was prepared to help you confirm your decision to purchase Pinpoint's Desktop Accessory software programs for the Apple II computer.

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No other one piece of software does more to improve the performance and productivity of your Apple II than PINPOINT AppleWorks Desktop Accessories.

THE NEXT LEVEL FOR APPLE II

The next level in integrated software, Pinpoint offers unparalleled ability to realize the performance potential of your system. Pinpoint supports:

• 128K to 16MB RAM from Apple, AST, Applied Engineering

and Checkmate

 A High-capacity UniDisk 3.5 floppy disks
 ProFile, Sider and Corvus hard disks
 Tian Accelerator IIe, Applied Engineering Transwarp and MCT Speed Demon accelerator cards

▲ Apple, Hayes, Prometheus, and Zoom internal/external 300/1200 baud modems

▲ Graphics and text printing with Apple, Epson, Hewlett-Packard, Okidata and other printers

▲ Compatibility with dozens of interface cards

HERE'S WHAT PINPOINT DOES TODAY

The next level in convenience, no other software works from inside AppleWorks, Business Works, and other selected ProDOS software, to add the functionality of Pinpoint's Desktop Accessories. For starters, Pinpoint includes:

▲ Appointment Calendar

- ▲ Four-function Calculator
- ▲ Modem Communications Window

- ▲ Smart Telephone Dialer
 ▲ GraphMerge Graphics & Text Printing
 ▲ Notepad Baby Word Processor
 ▲ QuickLabel Envelope Addresser
 ▲ Memory-Writer Style Typewriter

HERE'S WHAT'S COMING FOR PINPOINT TOMORROW

The next level in open-architecture, Pinpoint can grow beyond the original set of eight Desktop Accessories to include up to 16 Accessories on the Pinpoint Desktop. For example, when they actually become available, you may want to add new programs like:

A Pop-up Spelling Checker
Pop-up Thesaurus

- ▲ Pop-up Grammar Checker
- ▲ Instant Macro Keys ▲ Personal Check Writing
- ▲ Things to do Quick Lists
- ▲ Telephone Call Accounting

▲ Home Security and Appliance Control ▲ Travel Planner with Online Ticket Buying

In fact, some of these programs are just now becoming available from Pinpoint and other software developers.

VALUE THAT'S HARD TO BELIEVE

The next level in value, Pinpoint and optional Pinpoint Accessories are available nearly everywhere Apple Computers and Apple software is sold. Great software that becomes more valuable the more you use it, available today at very affordable prices

With Pinpoint you get all this:

PINPOINT'S POP-UP FEATURES

- ▲ RAM resident with extended RAM support or disk-based
- ▲ Pop-up from inside AppleWorks, Business Works, and other selected ProDOS software.
- ▲ Work with Catalyst, Mouse Desk and Prosel desktop
- ▲ Always available. Closed-Apple-P pops-up PINPOINT's main menu can display up to 16 Accessory titles (8 supplied
- with the original Pinpoint program).

 AppleWorks' 55K desktop remains undisturbed with PINPOINT installed in RAM (basic 128K Apple II configuration).
- ▲ Open-Architecture. Uses ProDOS system files for Accessories—up to 16MB RAM each using segmented memory architecture.
- ▲ Write new Accessories all your own with the Pinpoint

- ▲ File and command compatible with AppleWorks.
- Open-Apple command support, with pull-down menus and dialog boxes.
- ▲ Context-sensitive, online help screens.
- ▲ Convenient 'Drag Mode' moves the pop-up menu anywhere
- ▲ Customized Pinpoint disks can include one accessory several, or all as desired to save floppy disk or available
- RAM disk space.

 Use with any ProDOS device.
- ▲ Not copy protected.

USE PINPOINT WITHOUT APPLEWORKS

Individual Pinpoint Desktop Accessories can be used as stand-alone applications without AppleWorks, Business Works or other primary application. Select ProDOS BASIC from the Pinpoint menu to load

BASIC. Pressing Open-Apple-P pops-up Pinpoint's main menu. Select the Accessory you wish to run and press

Customized Pinpoint Disks

Pinpoint Desktop Accessories may be used individually, or in sets. All accessories are regular ProDOS system files, except the Dialer which is a RAM resident portion of the Pinpoint Dispatcher.

Accessories can be moved to and from any ProDOS 'working disk' to suit your individual requirements. This saves space on your 'working disks' and conserves valuable

For example, you may wish to include only the Note-pad, QuickLabel and Communications Accessories on your AppleWorks Database disks. Or just the Calendar, Notepad, Calculator, Typewriter and QuickLabel Accessories on your Word Processing and Spreadsheet disks. Or just use GraphMerge all by itself.

Copying Accessories
Use ProDOS Filer or Copy II Plus for copying Accessor ries on floppy disks; or you may use the Pinpoint RAM Enhancement Kit to automatically upload selected Acces-sories onto your partitioned RAM disk.

PINPOINT'S POP-UP SPELLING CHECKER

One bungled word can spoil your entire document. But not with Pinpoint's pop-up Spelling Checker by your side.

The Spelling Checker is a new optional accessory that is added to the Pinpoint Desktop. Absolutely the most convenient way to produce letter-perfect AppleWorks documents.

The Spelling Checker requires PINPOINT or it will not run. Because the Spelling Checker actually uses AppleWorks own editing power for automatic on-screen spelling corrections and page reformatting, the Spelling Checker works only with AppleWorks (word processing, spreadsheet and data

base modules).
Like other PINPOINT Accessories, the Spelling Checker pops-up from inside AppleWorks, ready anytime you want to check your work.

POP-UP SPELLING CHECKER FEATURES

- ▲ Checks documents of any size in memory.
- ▲ 60,000 word dictionary, refined from seven years of extensive use by over 250,000 people. Thorough testing has eliminated thousands of awkward, obscure, and antiquated words that might be incorrectly accepted as properly spelled words.
- ▲ Unlimited word capacity personal dictionary can be used for proper names, specialized terms, and frequently used abbreviations. This dictionary is limited only by ProDOS' 16MB maximum file size or the capacity of your disk.
- ▲ RAM resident Quick-Check list of frequently used words greatly speeds spell checking.

 A Four spell checking codes: check individual words,
- paragraphs or documents; and optionally, elect not to display alternative spellings (i.e., for classroom use).

 A Spell checking summaries: # words checked, # suspect words, # words corrected, and # added to personal
- dictionary. Summary display is optional.
- ▲ Configure default mode settings, including sound option, and paragraph/document spell checking summaries.

 One single-sided Apple 5.25" floppy disk can store the
- spell checking software, main dictionary and approximately
- a 3,000 word personal dictionary.

 ▲ One UniDisk 3.5™ can store AppleWorks, all eight original PINPOINT Desktop Accessories, the Spelling Checker plus both dictionaries at maximum capacity.

 ▲ For maximum performance, install the Spelling Checker
- on either a Hard Disk or partitioned RAM Disk using Pinpoint's RAM Enhancement Kit.

*Contact Pinpoint for more information.

USING THE SPELLING CHECKER

- ▲ On command, check individual words, paragraphs or entire documents. Also checks words in spreadsheets and database entries.
- ▲ When an 'unknown' (misspelled) word is located a list of up to 10 suggested alternative words pops-up next to the unknown word.
- ▲ Highlight an alternative word, then press RETURN to automatically correct the word in place.
- ▲ 'Unknown' words may be added to your personal dictionary, edited in place, or left unchanged
- ▲ Exit the Spelling Checker to PINPOINT or AppleWorks anytime.

NEW FOR SPRING 1986*

InfoMerge \$79. On-screen, direct printing mailing program for AppleWorks. Automatically select names from AppleWorks, or manually scan data files forward/backward, add keyboard inputs, automatic reformatting, on-screen preview, then print. Again and again. Works with AppleWorks and with Pinpoint Installed!

Point-to-Point \$129. Powerful telecomunications software with AppleWorks filecard interface, send/receive mail unattended (with clock), amazing conditional macros. XMODEM binary/text file transfers, 2400 Baud modem support and more. Works with Pinpoint installed!

Pinpoint Toolkit \$49. Ten handy new desktop accessories include programmer's calculator, pop-up Filer, accessory mover, video resource editor, resource converter, two screen print accessories, memory dump (window), the new RUN-RUN desktop environment, calendar printing accessories, plus a copy of "Inside Pinpoint", and complete reference manuals. For use with MICOL BASIC, KYAN PASCAL (available from Pinpoint) or ProDOS Assembler

- Pinpoint Apple IIe Upgrade Kit \$29.00

 ▲ Permits Pinpoint and many 'new' Apple IIe software programs to run on plain Apple IIe's with 128K.
- Solves many of the compatibility problems older software programs have with the Enhanced Apple IIe.
- Includes Mouse Text Video ROM, exact copy of Apple's Character Generator ROM #342-0265 approved by Apple.
- ▲ Includes GTE or Rockwell 65C02 microprocessor.
- ▲ Handy chip puller included. ▲ Does NOT include Apple's proprietary 'CD' and 'EF' ROMs required for most mouse-based software. Apple Computer requires us to inform you that this Kit does not "Enhance" the Apple Ile, this Kit is only to be used on Apple Ile's, and this upgrade is performed at users' own risk.

Pinpoint RAM Enhancement Kit \$29.00

- A Configures partitioned RAM disks.

 A Automatically uploads non-copy protected ProDOS applications and files to partitioned RAM disks.

 A Includes a ProDOS RAM switcher for AppleWorks with Pinpoint and other ProDOS applications uploaded into RAM, such as Business Works accounting software, Point-to-Point communications software, or InfoMerge mail merge and print formatting program.
- ▲ Requires Pinpoint.

Pinpoint Modem Enhancement Kit \$29.00

- ▲ Advanced modem software enhancement for Pinpoint's Communications Window.
- ▲ Logon macros with default communications setups.
- ▲ Keyboard and video character remapping (for encryption or terminal emulations). Selective character filtering.
- ▲ Required for Novation, Microcom and other non-standard external/internal modems or interface cards. Contact Pinpoint for details.
- ▲ Requires Pinpoint.

Pinpoint Printer Enhancement Kit \$8.00

- ▲ Advanced installation utilities for non-Apple standard printers and interface cards.
- ▲ Simultaneous text and graphics printing.

 ▲ Epson FX, RX, LX, and MX-80 with GraphTrax +; Okidata 84, 92, 93, 192; H-P Thinkjet; Panasonic KX P1091, Smith-Corono D-200, Star Micronics SD-10 and SG-10 printers with standard interface cards, require the Pinpoint Printer Ephasometr Kith print graphics with a sandard interface cards, require the Pinpoint Printer
- Enhancement Kit to print graphics and text.

 A Printer interfaces supported include: Generic BASIC Standard, Generic Pascal 1.1 Standard, Orange Micro Grappler Serial and Grappler + Parallel Cards, Star Micronics Grafstar and Grafstar II, Microtek Dumpling 64, Dumpling-GX, and RV-611C, Interactive Structures PKASO/U, and RC Systems Slot Buster.
- Contact Pinpoint for details.
- ▲ Requires Pinpoint. 24 Hour Toll Free Order Phone



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Pinpoint makes all the difference for your Apple.

Iselt



PINPOINT** Desktop Accessories Instant power tools. Desktop Accessories pop-up from inside AppleWorks: calendar, notepad, telecommunications, graphic and text merging, plus four others.

\$69

AST SprintDisk™



POINT-TO-POINT Call me, anytime. Set your clock; powerful macros do everything without you being there. AppleWorks filecard interface, XMODEM binary/ text file transfers, 2400 Baud modem support and more

\$129









SPELLING CHECKER

Faster way to write right. Pops-up inside AppleWorks to check words, paragraphs, or documents from 60,000 word dictionary. Shows up to 10 alternative spellings, corrects and reformats in place. \$69

Get the mail out. Automatically select names from AppleWorks, or

manually scan data files forward backward, add keyboard inputs, pre view, then print. Again and again.

Titan Accelerator IIe

INFOMERGE



INFOMERGE"

High-output sales manager. On-screen, direct merge-printing for AppleWorks. Automatic/manual rec-ord selection, keyboard input, auto reformatting, preview/review and multiple print options. \$79

Street Electronics BusinessCard*



1200A & 1200G







The big picture. Desktop Accessories pop-up from inside AppleWorks: graphic and text merging, envelope addressing, communications plus five others. \$69

Checkmate MultiRam IIe



Setation () in /SM IS recommon format / in not specified Current printer: not specified





First Class Peripherals Sider



PINPOINT™ Desktop Accessories The prince of power Open architecture, limited multi-tasking desktop manager with 8 convenient accessories. With Pinpoint Toolkit you can add your own. \$69



Applied Engineering RamWorks II



Signature X

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(Add \$3.00 shipping and handling. CA residents add 6.5% sales tax.)

\$125 Pinpoint Desktop Accessories and the Spelling Checker. Be sure to include the \$29 RAM Enhancement Kit, FREE.

\$129 Point-to-Point.

\$79 InfoMerge.

\$69 Pinpoint Desktop Accessories.

\$69 Pinpoint Spelling Checker.*

\$29 Pinpoint Apple IIe Upgrade Kit.

\$29 Pinpoint RAM Enhancement Kit.*

\$29 Pinpoint Modem Enhancement Kit.*

\$8 Pinpoint Graphic Printing Kit.*

Pinpoint's software requires an Apple IIc, Enhanced Apple IIe with 128K, or Apple IIe with Pinpoint Apple IIe Upgrade Kit and 128K. We recommend two floppy disk drives, a UniDisk 3.5,™ hard disk or RAM disk drive

*Requires Pinpoint Desktop Software

Pinpoint Publishing, Box 13323, Oakland, CA 94661 **2** (415) 654-3050

Introducing the next generation of Pinpoint performance software, integrated with AppleWorks,™ to help you manage just about everything. Including the mess on your desk.

Nonsense like important dates, graphics, words, numbers, telephone messages, online information, mass mailings and a lot more.

Smart software with more power, speed, capacity, and expandability than what you're using now.

So get what you paid for. And let that powerful new Apple II hardware do the work, so you don't have to.

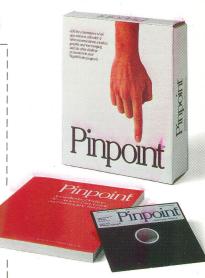
Not only will our software make you a great deal more productive; it costs a good deal less than you might think.

Stop by a dealer near you for a test drive. Or call Toll Free and order direct from Pinpoint.

If, after 30 days, you're not completely satisfied, you can have your old mess back.

So you have nothing to lose. Except the mess on your desk.

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FOR APPLE II USERS COMPUTING

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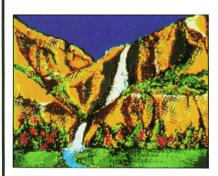
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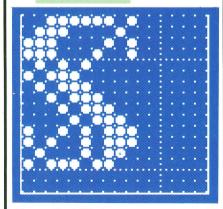
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READER FORUM

A FRESH APPLE

Our family has recently purchased an Apple IIe computer, no frills attached! When we found two issues of *II Computing* we eagerly pored through them. We like the format and the great variety of usable programs.

To date I have typed in five of your programs including Typo II Maker, and I'm planning more. Ladybug is a lot of fun and Hi-Res Labeler was a learning experience! Both are now running properly thanks to Typo II.

We look forward to future issues of *II Computing* and we congratulate you on a great magazine. We would like to see lots of educational programs as our children are now 6 and 2-1/2 and eager to use our new computer too!

Claudia Boorman Victoria, BC, Canada

(Editor's Note: The August/September issue will be our special Education issue.)

SWYFT REPLY

We are pleased that *II Computing* reviewed SwyftCard (February/March 1986 issue) and found it "revolutionary," but regret that the review contains a number of errors.

SwyftWare is available for both the IIe and the IIc, not just the IIe.

More importantly, the reviewer did not evaluate over half the package: there are no comments on its calculation-in-text abilities nor its information retrieval technology.

He asks for a "more powerful word processor," confusing the radical simplicity of SwyftCard for lack of power. How many word processors can do information retrieval, telecommunications and calculations—all without having to ever go to a menu or interrupt the flow of your work? The true "power" of a

word processor lies in the productivity and ease of use, not in the number of bells and whistles.

The reviewer's unnecessary request for "previewing printouts" fails to recognize that this is provided at all times—SwyftCard always shows you how the text will look when printed. The reviewer also fails to comment on the extraordinary fact that to employ all of SwyftCard's abilities requires the user to learn only *five* commands.

Unfortunately, the reviewer did not take the time to understand the ease of interactive dialog with a remote computer using the telecommunications facility—you do not have to "highlight all lines or commands sent to the remote computer"—this is done automatically by the SwyftCard's single keypress Send command. SwyftCard is the only product where telecommunications is available full time even while you are using its other abilities.

When using Applesoft BASIC from within SwyftCard, you do not lose any error messages. They behave exactly as they always have.

The techniques for less common operations such as search-and-replace are explained in the manual. The secret of SwyftCard is that operations you use *often* (like typing, or moving the cursor) are *blindingly fast*. Search-and-replace is something you do relatively seldom, and is thus allowed to be slower rather than adding to the complexity the user has to face.

We are pleased that Mr. Shapiro says that our product is "revolutionary in concept." We are sorry that he is not yet ready to join the revolution. He describes our "leaping" technology for cursor motion in some detail. Leaping is over five times faster than cursor control keys, and over twice as fast as a mouse. Nonetheless he says that he "never stopped wishing" for cursor control

READER FORUM

keys. It does take time to unlearn old habits when a new and better technology comes along.

> Jef Raskin, CEO Information Appliance, Inc.

Neil Shapiro replies:

I think the SwyftCard is a useful adjunct for many people with Apple computers. I do not feel the overall conclusions reached by the review are invalid. To comment on the points Mr. Raskin has raised:

The manual that I have is subtitled "Using SwyftCard on the Apple IIe." The manual makes no reference to a IIc version and I am not sure if that version was available at the time I wrote the review. That it is available now is good news.

Previewing printouts, to me, means more than seeing line breaks. It also includes headers and footers, normal and justified text, italic or other emphasized fonts, all made visible before printing. But with SwyftCard the only way to communicate font changes to a printer is knowing and embedding your own printer's anonymous-looking control codes in the text.

I used the SwyftCard extensively for telecommunications on two computer networks—a total of more than twenty hours of use. All commands or text strings transmitted to the remote computer must be sent with the control-D (send) command. This means a control-S (to stop output from a remote computer) becomes twice as many keystrokes. Hitting control-D rather than RETURN to send a line quickly becomes tiring.

I agree that SwyftCard is blindingly fast; as I wrote, "the cursor really does leap just as fast as you can type." But while "leaping" is certainly a wonderful new method for moving the cursor, I still prefer to

use leaping only in conjuction with other methods.

Mr. Raskin is correct that BASIC error messages remain once the SwyftCard is installed. I have since traced the problem I had: an accessory program (not from Information Appliance), and not SwyftCard, was blocking those messages. I apologize for that inaccuracy.

I did not mention the calculation routines, since they appear to me to be merely another method of using BASIC. Typing "? 3 + 2" is very familiar to anyone with an Apple II, and I assumed the mention of accessing BASIC from within Swyft-Card would suffice.

Although this reply has caused me to reiterate the few negative comments I made, I have recommended SwyftCard to many people in the past few months. As I said in the original review, SwyftCard is "definitely a good value for those who may need simple word processing in conjunction with the other features mentioned."

SWYFT PRAISE

Thank you for filling a large gap in the computer publishing field. I look forward to each new issue of *II Com*-

puting and anticipate the time when it arrives more frequently.

Thanks also to Neil Shapiro for his well done and essentially fair review of the SwyftCard. The only weakness in his report should be cleared up by now as he uses the system a bit more. I too would like to see a super SwyftCard. However as a heavy user of the only one available for now, I find it is by far the most valuable accessory in my Apple He and by far best value for the money. I write contracts (saving important clauses on one disk for later use) and use it for making forms with downloaded fonts (it allows control characters to be entered without moving the text, a very important item when designing special forms built up from special characters).

Dick Lawrence Nicholasville, KY

65C02 REVISITED

I enjoyed Morgan Caffrey's article on the 65C02 in your first issue, and I have a few comments.

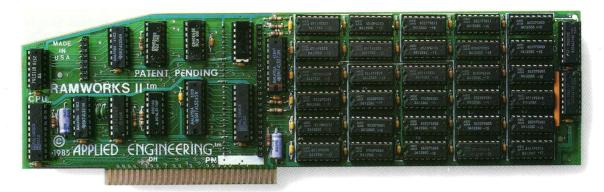
Generally speaking, the 65C02 is "upwards compatible" with the 6502, meaning 6502 programs will run on continued on page 10

Reader Service Card

With this issue of *II Computing*, we begin a new service for you: our Reader Service card, which you'll find bound into the magazine near the back. To learn more about any product you see in *II Computing*, just fill out the card, circle the appropriate numbers and drop the card in the mail, postage paid. Automatically, your request goes to the corresponding companies, and they'll send you information about their products or services. Remember, our advertisers want to hear from you, and your interest in their products helps us bring you *II Computing*.

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While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else including Apple in offering more than 55K in AppleWorks and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Just look at all the AppleWorks enhancements that even Apple's own card does not provide and only RamWorks II does. With a 256K or larger RamWorks II, all of AppleWorks will automatically load itself into RAM dramatically increasing speed by eliminating all the time required to access the program disk drive. Now switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

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Works II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

RamWorks II, <u>nothing</u> comes close to enhancing AppleWorks so much.

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Using RamWorks II couldn't be easier because it's compatible with more offthe-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and all hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

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Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or multiple 16 MEG cards just snap directly onto RamWorks II by plugging into the

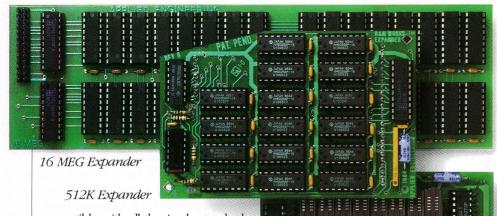
industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB and for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only \$129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

True 65C816 16 Bit Power.

RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

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Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

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CIRCLE 110 ON READERS SERVICE CARD

READER FORUM

READER FORUM continued from page 7

machines with the enhanced chip. The exceptions are certain timecritical programs that rely on a specific number of cycles during the execution of a subroutine. Morgan mentioned the instructions ASL and LSR (absolute X mode) but omitted ROL and ROR. All four (with no page crossing) decreased from seven to six cycles. There was no change in the speed of INC and DEC; I suspect he meant ROL and ROR. One other instruction (JMP indirect) increased from five to six cycles. Presumably because of the problems in time-critical applications, the original number of cycles has been restored in the later 65802 chip.

Morgan mentioned the new addressing mode (implied) of the INC and DEC instructions, but he listed the mnemonics as INA and DEA. They have not changed; the correct syntax is INC (no operand) or alternatively, depending on which assembler you use, INC A.

Morgan indicated that programs written in 65C02 code would not execute on earlier Apple IIs. In addition, the 65C02 chip will not function correctly on a II + because of timing differences in the hardware.

The 65C02 is available in three clock speeds, 2, 3 or 4 MHz. It is available from several manufacturers; the one supplied by Rockwell has four additional zero-page mode instructions, BBR and BBS, SMB and RMB. These instructions affect individual bits of a byte. The former group will test the specified bit of a zero-page location and branch accordingly. For example, BBS6 LABEL tests bit 6 of a zero-page byte, and branches if it is set. The latter group allows you to set or clear specific bits in a zero-page byte. The syntax is similar: RMB7 \$FF clears bit 7 of the data at location \$FF.

A true 16-bit register was on Morgan's wish list; it may be easier to find than he thinks. Western Design's 65802 and 65816 have 16-bit A, X, Y, PC and Direct registers (Direct is new) plus an 8-bit Program Bank register. This family is to the 65C02 what the 65C02 is to the 6502. It has 255 opcodes and nine new addressing modes, with relative branching 32K bytes in either direction and a contiguous 16-megabyte memory range. Best of all, it too is upwards compatible with the 65C02 and 6502. We have tested it extensively on an Apple III, and it will probably run on the IIe and IIc.

> Val J. Golding Tarzana, CA

VOX POPULI

Terrific! I'm really, really going to *like II Computing*. I really hope that you continue to maintain the sense of excitement, optimism and enthusiasm that permeates the first issue.

Give every Apple club in the world a chance to vent their spleen in *II Computing*. These clubs, the user base, are the master gland and *vox populi* of the Body Apple.

Hit AppleWorks hard. This program will do more to perpetuate the Apple II Forever concept than all other entities combined.

Duane J. Lane Hollywood, FL

NIX MACS

Your articles all seem to be informative so far, and I hope that you keep up the good work. One other thing: try to resist the urge to include Macintosh coverage in your magazine. When another Apple magazine switched to add Macintosh coverage, the articles about the Apple II became worse.

Andy Bender Tarzana, CA

SOTTO VOCE

Apple's Rezzy Graphics:

Where Did They All Come From?

by MARGOT COMSTOCK

In the very late 1970s, when people were just beginning to buy home computers, possibly the greatest appeal of the Apple II over its closest competitors, Commodore's Pet and Tandy's TRS-80, was its color graphics capability. Blocky but colorful shapes sparkled on television screens; see-through boxes tumbling awkwardly through space drew admiring attention. The potential was all there, but the infant was newborn; there was everything to learn. And the Apple's pizzazz and programming friend-liness ensured plenty of talent to plumb its depths.

"Graphics was a big influence in interesting young programmers in the Apple II," says David Durkee, president of Pacific Bit-Works, a new software development company whose first, currently secret project is under contract to Origin Systems.

"In 1979, everything was already in the computer," says Mark Pelczarski, founder and president of Polarware (Penguin Software), publisher of some of the most widely used graphics utilities for Apple II. "But only outlining was being done in hi-res; lots was being done in lo-res, really sharp lo-res. No one knew that lurking in the machine was Raster Blaster. It's the most amazing thing, that it was already in there; it only had to be uncovered."

"The capacity is in the workmen, not in the tool," counters Dave Albert, former Penguin and currently vice-president of Origin Systems. "And Mark's [Pelczarski's] Graphics Magician was a major milestone. Apple provided a dependable, well-engineered machine—way over the others in those regards—and that created a market for graphics tools. Just about all the trailblazing was done on the Apple II."

In the formative years of the infant personal computer have come a plethora of discovery and creativity in graphics.

ROCKING THE CRADLE

Ken Williams, founding president of Sierra On-Line, attributes the first significant contribution to Apple II graphics to Californian Vern Bauman. Bauman developed a graphics package that included color-fill routines and a graphics input device that was a forerunner of the graphics tablet.

But both Williams and Doug Carlston, founding president of Broderbund Software credit Bill Budge and Bob Bishop with sowing the seeds for the rapid refinement of hi-res graphics.



It's too bad we don't see more of Bishop's work.



"Bill's Lunar Lander, though still black and white hi-res, was smooth with good explosions," says Williams. Carlston also pointed to Budge's smoothly moving hi-res objects in Lunar Lander, Trilogy, Space Album and several others. "Budge's Space Album," says Williams, "And his 3-D graphics package," says Carlston, "began forging a path for 3-D graphics on the Apple," say they both.

"Bishop went a slightly different direction," according to Carlston, "with hi-res animated white shapes as in AppleVision." To this day Apple uses AppleVision as a demo of hi-res animation. Says Budge himself, "Bob Bishop did amazing things before I got there." It's too bad we don't see more of Bob Bishop's work these days.

continued on next page



Margot Comstock was cofounder and editor of Softalk. It was great fun, but it was just one of those things.

SOTTO VOCE

NO DOGS IN OUR MANGERS

The history of Apple graphics? "In a word, Woz," says Pelczarski. Steve Wozniak made the tool, and he set the pace. "The development was very open; developers shared their ideas and built on each other's discoveries. Developers would put out tools, and artists using them would come back with ideas, then the developers would figure out how to implement the ideas with new tools."

As a result of the open atmosphere, improvements in use of space and colors came rapidly. Williams's Mystery House, designed by Roberta Williams, broke ground in picture compression. The first graphics adventure game, Mystery House introduced multiple hi-res pictures on one disk, albeit black and white outlined pictures; a year later, Williams pioneered another step in compressed pictures with The Wizard and the Princess, adding full color to its near hundred scenes.

SEVEN-BIT MOVEMENT, RED OR BLUE

Seven-bit movement is the term that describes how objects moved on the Apple's hi-res screen from the beginning. Objects moved in seven-bit, or onebyte, increments, which produced really choppy movement with speed; and internal motion, or animation, within the object occurs only every seven bits. "I think Super Invader was the first to get seven-bit movement smooth, using block shapes," says Carlston. Super Invader, by the mysterious M. Hata of Japan, was the first really rezzy arcade game simulation on personal computers. But sevenbit shapes are only animated while they move horizontally; moving vertically, they're still. And they take a lot of memory. On top of that, they have color problems: even-column pixels are a different color from odd.

Carlston thinks Nasir Gebelli, then of the late, once-great Sirius Software, was the first to add full color to smoothly animated hi-res images, which he did in Star Cruiser. Yet, just as quickly as it had risen, Star Cruiser dropped completely off the bestsellers and was no more seen.

SIX-PACK IN THE FRIDGE

Bill Budge's Raster Blaster was to most folks the first realistic pinball simulation, with smooth high speed motion, and we enthusiastically enjoyed it. But Williams, certainly one of the most brilliant engineers working in personal computers, spent nearly a month studying the concept behind it. To him, as to Carlston, Pelczarski and Robert Woodhead (no slouches they, either), Raster Blaster represents the most significant leap in graphics tech-

nology before the Macintosh-type graphics. The concept was called preshifted shapes, and it is very simple.

"In essence," according to Williams, "what Budge figured out was that you could redraw only the part of the shape that changes, not the whole shape, for each change in the process of the shape's motion." Given that, Budge found he could make seven changes in an object's shape during its sevenbit movement – effectively creating a new shape for each bit, seven images for each byte instead of one large one. So where before, the entire pinball would have to be redrawn for each frame, now Budge merely shifted the shape over one bit with regard to the byte boundary. That meant seven times as many increments to any motion, thus much smoother movement and the ability to move much faster without choppiness. In addition, shifting shapes in two-bit increments got rid of the changing-color problem.

The Apple's programming friendliness ensured plenty of talent to plumb its depth.

There were others developing similar technology, Pelczarski believes—Tony Suzuki probably used it in Apple Galaxian. "But Budge invented the term and was the one willing to share his methods."

And Budge took the concept one giant step farther. Each animated object using preshifted shapes has seven positions, so requires seven pictures. "Budge put six of the images in look-up tables, keeping only one in memory," explains Carlston, "which saved a lot of memory, wasn't much slower, and allowed animation in all directions." Nor are the tables confined to six shapes—they can contain whatever you need. That's called shifting on the fly. Really.

LITTLE THINGS MEAN A LOT

Things like preshifted shapes are why Mark Pelczarski says of Budge, "His work led to Graphics Magician — and much more. Pelczarski's Graphics Magician is "a storage instruction set," according to Dave Albert, which made the new technology available to many programmers.

"After Raster Blaster, there was a big lag in breakthroughs, but during that time came much refinement in techniques, in use of available tech-

continued on page 14

What the Experts are Saying About RamWorks II!

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."

—InfoWorld

"AppleWorks wiped out Symphony...
The competition was set up partly to show off another of Wozniak's favorite things, the RamWorks II memory expansion board from Applied Engineering ..."

—San Jose Business Journal

"There are huge differences among the AppleWorks modifying programs sold with the cards. Without doubt, RamWorks II is the most powerful."

—inCider

"Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks... I like the product so much that I am buying one for my own system."

—A+ Magazine

"RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars... For my money, Applied Engineering's RamWorks II is king of the hill."

-inCider



As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the

competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible". At least they agree on one thing.

RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

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SOTTO VOCE

APPLE'S REZZY GRAPHICS continued from page 12

nology," says Williams. Carlston agrees: "After that there wasn't much until the Xerox PARC stuff, introduced by [guess who] Bill Budge in Pinball Construction Set." To Pelczarski, "The only new things are super higher resolution type things; but



Bill Budge developed preshifted shapes to create Raster Blaster.

they're just extensions of what's been there since the beginning; just adding better resolution and more colors." But Williams likes expansion, and credits David Snider and Broderbund's Dazzle Draw as "the first program to make real use of Apple's expansion to double hi-res, using the mouse and windows technology as well."

Robert Woodhead, author of Sir-Tech Software's Wizardry, sums it up: "Graphics innovation occurs in two ways: one, new things to do; and, two, new ways to do old things—color fill, things going faster, for example. The second category isn't that important; the first category is more important. There, the milestones are things like the graphics interface in Bill Budge's Pinball Construction Set, and Dan Gorlin's Choplifter."

XEROXING XEROX-SORT OF

Xerox PARC came up with the idea; Apple refined it and made it usable through Lisa Technology and the Macintosh. Bill Budge brought it to the Apple II, where it became the II's next big deal in graphics. We know it as windows and pull-down menus, mice and lots of things being easier to use on our Apples. And it's all because it's all graphics. Carlston especially likes rubberbanding, "which Budge may also have invented and which makes drawing easier." It does it by letting you stretch a shape to the size and position you want it, then letting go, and it stays there—"much better than clicking on two points and hoping the shape will

look the way you want," says Durkee, who likes it too.

Pelczarski favors the change exemplified by the Macintosh Toolbox, in which "a lot of the tools that used to have to be written are built into the computer. All the routines the developer needs are in the toolbox, part of the computer." Several experts hint that this is the direction the II is headed—in addition to, not instead of, what's already there.

THE LITTLE COMPUTER THAT COULD

The advent of the total-graphics and mouse technology blazed a trail into unexplored territory from which a lot of good things are still to come. Since then, most graphics refinements have been in that area, but not all.

Williams would not have us forget his King's Quest and King's Quest II, *animated* sixteen-color graphics adventures, and he's right; and he stresses the importance of Broderbund's Fantavision, which "introduced animation no one thought could be done." Fantavision's breakthrough is a technique called "tweening, which refers to linear interpolation . . . ," and that's all Carlston's saying.

What's ahead? Most of our experts' thoughts turn to compact disks—well, not always favorably. But Mark Pelczarski is excited by the potential. "Graphics now rival what can be done with video—and it's the larger RAM that makes it possible. Which brings up the next major change: video. Compact disks can display video; some computers already use them to some extent, although no one has used graphics yet. So the next step is graphics that aren't computer graphics at all, but film."

Doug Carlston has a different concern. 'It tends to cut out the imagination. I'm not sure realism is worth the cost, because it leaves out so much. Film is not necessarily a good thing."

About CDs, Ken Williams is mum, but he does think Apple II software graphics have gone about as far as they can go.

"Now the ball is in Apple's court," says Williams. "Now it's up to Apple to improve the hardware. Then we're all back to ground zero."

Rumor has it that Apple's caught the ball and is running straight for another Apple II touchdown.//

The results of *Il Computing*'s Subscriber Survey will appear in the August/September issue.



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> Steve Wozniak, the creator of Apple Computer

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A Graphics Primer

Step by Step To Hi-Res

by FRANK HAYES, Assistant Editor

Once upon a time there was a computer with color graphics. . .

In the early days of personal computers, nothing else could match the Apple II when it came to graphics. Steve Wozniak's ingenious design allowed as many as 16 colors, or up to 280-by-192 resolution for graphics—unheard of at a time when many computers could only create pictures by printing Xs on a teletype.

The Apple II can still hold its own when it comes to graphics. A IIc or enhanced IIe with an extended 80-column card can display graphics in lo-res, hires and double hi-res—up to **560-by-192** resolution. To use that graphics power from BASIC, though, you'll need to learn something about BASIC's commands for putting pictures on your monitor's screen.

LO-RES GRAPHICS

The kind of graphics most Apple II owners first

learn to use is low-resolution (or lo-res) graphics. In low-resolution graphics mode, the screen is divided into a grid 40 blocks wide and up to 48 blocks high. If that sounds similar to the 40 characters wide by 24 characters high on your 40-column screen, it is: two lo-res graphics blocks stacked on top of each other fit in exactly the same space as one 40-column character.

Experimenting with lo-res graphics is easy in BASIC. From the "]" prompt, type the command

GR

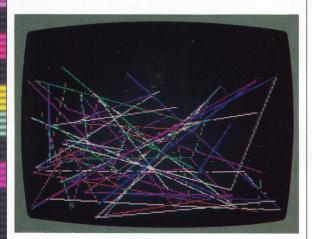
and press RETURN. The top part of your screen will clear, and the prompt will appear at the bottom of the screen. (Only the bottom four lines of the screen are available for text in this mode.)

The program named GRAPHICS.DEMO in

EDUCATION

this month's Software Library has examples demonstrating each kind of Apple II graphics. Type it in from page 52 (or boot it from the Action Disk) and select routine 1 from the menu. This routine, which runs from line 100 to 160 in the listing, demonstrates two of the lo-res graphics commands. The COLOR command in line 110 selects which of the Apple's 16 colors will be used for drawing blocks on the screen. (Figure 1 lists the 16 colors that will appear if you've got a color television or monitor; if you're using a monochrome monitor or TV, you'll just get shades of grey or green.) The PLOT command in line 140 puts a block on the screen at a particular position: for example, PLOT 13,5 plots a block on the screen in column 13, row 5. In routine 1, both the position and the color of the block are random.

Drawing lo-res lines is easy, too. HLIN and VLIN draw a horizontal or vertical line respectively. For example, HLIN 12,20 AT 8 draws a line on row 8 from column 12 to column 20, and VLIN 6,18 AT 31 draws a vertical line along column 31 from row 6 to row 18. Routine 2 is an example of using HLIN and VLIN to draw random bars on the screen. (The HLIN and VLIN commands appear in lines 240 and 245.)



Diagonal scribbling in hi-res from GRAPHICS.DEMO.

Three other things are important to know about lo-res graphics. First, you can use the whole screen for graphics by performing a single POKE command

POKE 49234,0

Of course, when the bottom of the screen contains graphics, you can't see the commands or program lines you type in (though they'll still work). You

can clear the screen completely by using the command

CALL -1998

Finally, when you want to go back to an ordinary text screen, just enter the command

TEXT

and you'll be back in text mode. When you switch from lo-res graphics to text mode, you'll usually see "garbage" characters on your screen. That garbage isn't random: each letter represents one pair of lo-res blocks, because lo-res graphics and text use the same part of memory. You might say they're just two different ways the computer has of looking at the same information.

HI-RES GRAPHICS

High-resolution graphics commands are a little more complicated than lo-res. With hi-res graphics, there are 280 dots across the width of the screen, and up to 192 dots from top to bottom; however, there are only six different colors available. The colors are listed in Figure 2; as you can see, black and white appear twice on the list, but the two versions are the same color.

You can experiment with the hi-res graphics easily in BASIC, too. From the "]" prompt, enter the command

HGR

As with lo-res, the top part of your screen clears. (The prompt *wont* automatically appear at the bottom of the screen; type the RETURN key until you can see the prompt again.)

Now try routine 3 in the demo program—a hires version of routine 1. As you can see, the hi-res commands work almost exactly like their lo-res equivalents. HCOLOR selects the color and HPLOT puts a dot on the screen (lines 310 and 340). There's a difference, though: HPLOT is much more flexible than PLOT. The command

HPLOT A,B TO X,Y

draws a line between points A,B and X,Y on the hi-res screen, whether the line is horizontal, vertical, or diagonal. Routine 4 is the hi-res version of the bar-plotting routine (lines 400-455 in the listing). And because HPLOT can draw a line in any direction, it's easy to create a hi-res diagonal-line scribbler, too—that's routine 5 (lines 500-590).

As with lo-res graphics, you can use the whole hi-res screen if you POKE 49234,0. And of course you can return to text mode with the TEXT command.

Figure 1

- 0 black
- 1 magenta
- 2 dark blue
- 3 purple
- 4 dark green
- 5 grey
- 5 grey
- 6 medium blue
- 7 light blue
- 8 brown
- 9 orange
- 10 grey
- 11 pink
- 12 green
- 13 yellow
- 14 aqua
- 15 white

Figure 2

- 0 black
- 1 green
- 2 violet
- 3 white
- 4 black
- 5 orange
- 6 blue
- 7 white



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EDUCATION

A GRAPHICS PRIMER continued from page 17

SHAPE TABLES

There are four special commands that can really speed up your ability to draw in hi-res: DRAW, XDRAW, SCALE and ROT. But to understand how they work, you first have to know something about **shape tables**.

A shape table is like a special program for drawing on the hi-res screen. It consists of a series of shapes—as many as 255 in each shape table. A shape, in turn, is a string of specially coded instructions telling the computer what to draw. The instructions are very simple: they're all in the form "move in this direction while drawing" or "move in that direction while not drawing," and there are only four directions to move (up, down, left and right).

For example, a small square might consist of just four instructions: "move left while drawing," "move up while drawing," "move right while drawing" and "move down while drawing." A more complicated figure, of course, would take more instructions to draw. But since the instructions are so simple, they can be packed into a very small space—and the computer can perform them very quickly.

Unfortunately, there's no simple way to create a shape table with BASIC commands. You have to construct it yourself, then POKE the table into memory. Drawing a shape that's in your table is easy, though: just use the DRAW command. For example,

DRAW 2 AT 103,74

will draw the second shape in the shape table, and begin drawing at column 103, row 74. The XDRAW command "undraws" the shape; the command

XDRAW 2 AT 103,74

would wipe away the results of that DRAW command.

You can specify how big your shape should be drawn with the SCALE command. SCALE = 1 is the smallest possible size for any shape; SCALE = 10 makes a shape 10 times as big, and SCALE = 255 makes it 255 times as big. The one anomaly is SCALE = 0: that makes the shape 256 times as big as SCALE = 1.

You can even rotate a shape to face in a different direction using the ROT command. ROT = 0 will draw the shape normally, ROT = 8 will rotate it clockwise 45 degrees and higher values for ROT will turn it more, until ROT = 64 draws it nor-

mally again.

Routine 6 uses all four shape-table commands. Lines 600-630 POKE a shape table into memory, and the rest of the routine (through line 685) chooses random rotation, scale and position to DRAW the shape on the screen. Press RETURN to XDRAW the shape and draw a new one. (You'll notice that sometimes XDRAW doesn't "undraw" the shape perfectly—that's the result of rotating it to a diagonal angle.)

DOUBLE HI-RES GRAPHICS

There's an even more detailed kind of Apple graphics available if you've got a 128K enhanced Apple IIe or Apple IIc. It's double high-resolution graphics, and it uses twice as much memory to produce twice as many dots as hi-res—up to 560 dots across the screen. It can also let you use all 16 Apple colors in hi-res.

Because of the extended range of colors and the higher graphics resolution, more and more games for the Apple II use double hi-res graphics. That's why some games require 128K—they're designed for the special graphics that only Apples with the extra memory can offer. And graphics programs such as Dazzle Draw and Beagle Graphics are designed to let you use the extra colors and resolution, too.

Unfortunately, Applesoft BASIC's commands don't support double hi-res. (That's because when Applesoft was written, there **was** no double hi-res.) It's still possible to use double hi-res graphics from BASIC: you just have to use lots of POKEs, and it's pretty slow going.

The final routine in GRAPHICS.DEMO, routine 7, is a double hi-res version of the hi-res scribbler routine. It works best if you've got a monochrome monitor, and it's very slow—the result of having to do everything from POKEs and loops in BASIC (you can see what it's doing in lines 700-960 of the listing). But it should give you an idea of just how high the resolution on your Apple can be.//

PRODUCT INFORMATION

To learn more about Apple II graphics, here are several books that should help.

Apple Graphics Activities Handbook by Harold J. Bailey and J. Edward Kerlin (Robert J. Brady Co.).
CIRCLE 205 ON READER SERVICE CARD

Apple Graphics: Tools and Techniques by Michael L. Callery and Roberta Schwartz (Prentice-Hall).
CIRCLE 206 ON READER SERVICE CARD

Animation Magic with Your Apple IIe and IIc by Ron Pearson (Osborne-McGraw-Hill).

Artists Using Apple Ils

Creative Possibilities Unlimited

by MARD NAMAN



'1 didn't use anything like reverse or slant—I just drew a fat lady swimming.'

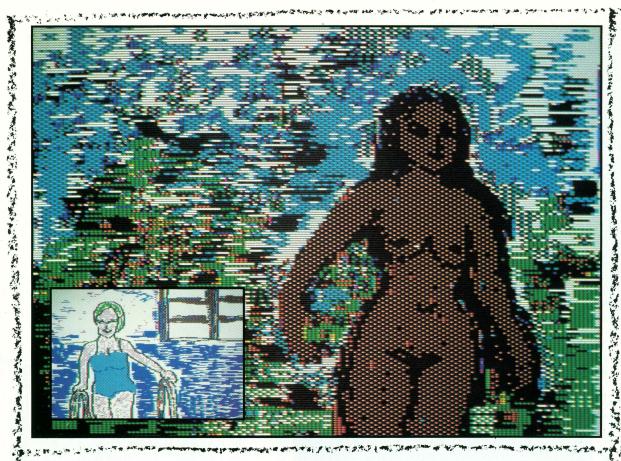
ELEANOR KENT

Eleanor Kent's richly colored, expressive artwork may use computer technology but at heart she is still just a painter. Take for instance, two of her fine computer paintings. "The Swimmer" and "The Maiden." To create these works Eleanor used her Apple IIe, an Apple Graphics Tablet and a software product called Designer's Toolkit. The graphics tablet provides a flat 12" x 12" surface on which to place an overlay. It has a stylus on a cord that plugs into the computer. When a person draws with the stylus, its point registers on the tablet and on the screen. "So your eye is watching the monitor. rather than your hand," says Kent. "After a while you get used to it." Kent says this system is far better than drawing with a mouse. "Working with a mouse is like trying to draw with a bar of soap," she says.

To make "The Swimmer" Kent drew a picture of a person and then colored and changed it till she had something she liked. Designer's Toolkit (see sidebar) offers the artist bells and whistles but Kent likes to keep things simple. "Mostly I just drew," she says. "I didn't use any of the funny things like reverse or tip around or slant. I just drew a fat lady swimming."

But she was not through yet. "I wondered, 'what else can I do with this?" "This time Kent did use one of the "funny features." She reversed the image. Then Kent drew on the image, took off the bathing suit, shed a few pounds in the right places and gave it a South Sea Island look. Voila, "The Maiden" was created. Says Kent, "It's fun intellectually and emotionally to change an elderly swimmer into this gorgeous lady of the jungle."

According to Kent there's nothing quite like the colors in computer art. "There's a kind of lovely luminosity that comes when you have a picture on the screen. The light comes from behind it and the color is rich, particularly in the dark. It gives saturated color, a glowingness you can't get from paint. There's this wonderful feeling of molding light, of drawing with the light and I think that comes through on the color prints very well."



- © 1985 Maiden Eleanor Kent
- © 1985 Inset: Swimmer Eleanor Kent



Lucia Grossberger has always been interested in art, but because she is allergic to most types of paint, she had to look for another medium to work in. "When I heard you could do graphics on a computer, I became obsessed!" she enthuses. "I had found my medium. Something clicked in me because computer art is not just intuitive. It's also intellectual. It's left brain and right brain."

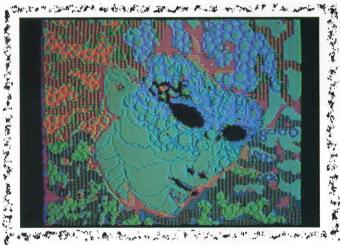
That was six and a half years ago. Today, Grossberger not only produces beautiful and original art on her Apple II +, she also has codesigned Designer's Toolkit, a paint program many other computer artists use (see sidebar). Grossberger's versatility can be seen in her

continued on next page

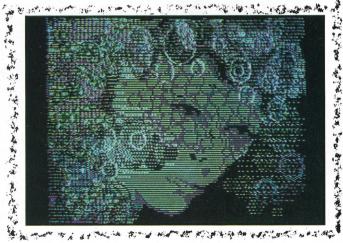
21



© 1984 Lucia Grossberg



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© 1984 Lucia Grossberg

piece called "Changes." You cannot fully appreciate this art outside the computer. Grossberger calls "Changes" an art disk. This means the disk contains the information for the work and to see it in its entirety you need to have access to the computer. Because, as its title indicates, the image in this art work constantly changes.

To make "Changes," Grossberger first got a black and white video camera. Using the Computereyes digitizing system, she scanned the image of David Bowie from the album *Heroes*.

Once the image was scanned and saved, Grossberger used Designer's Toolkit to edit and alter the image many different ways.

After she created and saved all the images she wanted, Grossberger was able to bring the images to life using the P.A.C.K. (Programmer's Assembly-Language Construction Kit). This program, which Grossberger also co-authored, brings the images onto the screen in very unusual ways. In TV terms she used a "wipe," in which a new image starts at one place on the screen (e.g., left side, bottom) and sweeps over the old image replacing it.

In Grossberger's work what you see is really a form of animation; you watch one image of David Bowie change into another one and then another one for as long as you want. These dynamic screen changes are created by writing a BASIC program that accesses each image. Watching one image turn into another is a fascinating, almost mesmerizing experience. Indeed, "Changes" provides a unique artistic vision that would never have been possible without a computer.

Portrait of the Artist as a Colonial Animal $40'' \times 27''$ Collage © 1984 Iguretta lones





'1 often give a client two or three color versions of the same drawing, something a traditional illustrator cannot do.''



Lauretta Jones does a lot of commercial illustration work for magazines. So when she got her Apple II + in 1982, it was important for her to produce professional quality illustrations. In addition to an Apple Graphics Tablet, she bought a "Number Nine Board." This board gives much greater resolution (512 dots across and down as opposed to 280 across and 192 down) and provides more vibrant colors. Says Jones, "The color in the Apple is not good enough for the professional level illustrations I do. I couldn't do the same quality of work with the regular Apple. That's why I needed the Number Nine Board."

Jones uses a paint program called V-Paint. She describes this software as "very, very basic." V-Paint requires two monitors. One has a menu on it, the other the artist's image. The graphics tablet has a spring-loaded stylus. If you apply no pressure, but let the stylus rest on the tablet, you get a cursor on either the menu or image monitor. If you're on the menu, you will have a choice of commands like Draw, Brush, Line, Box, Circle or Fill. Says Jones, "You center the cursor over the item you want and press down once. Let's say you have picked 'Draw'. Immediately your cursor goes to the drawing screen on the other monitor."

Jones says the program is fine for basic painting—it will draw straight lines, circles and fill in - but she is sometimes frustrated by its limitations. For example, unlike some other programs, V-Paint cannot turn an image upside down or reverse it. Nor can it merge two images. Also, while the program can "rubber stamp" images (i.e. create a twin image), Jones says it cannot place the rubber stamp image accurately enough in the picture. For instance, for a medical illustration she had to hand draw three stethoscopes rather than draw one, pick it up and rubber stamp it somewhere else in the picture.

But she likes the way she can use color with the program. When she moves her cursor to the bottom of the image monitor, a palette is revealed. To choose a color, she centers her cursor on the color she wants and presses down once. At any one time, she can work with 16 colors. That's the maximum number of colors that can go into any one drawing. But they could be, for example, 16 shades of red. Or green.

continued on next page

There are actually 4,096 colors from which to choose to fill those 16 slots. And she can mix colors in a process called "dithering." When she chooses two colors in a row, the program mixes them in a microscopic checkerboard pattern. She can, for example, mix two shades of red and blue to get purple.

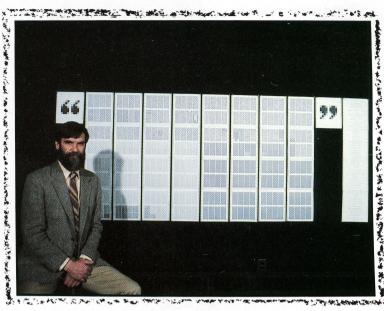
Jones says what she loves best about working on her computer is the way she can change colors. "I find it actually changes the way I work, especially for my commercial work. I'll work up a drawing in approximate colors and only at the very end will I finalize the palette. And I often give a client two or three color versions of the same drawing, maybe changing the background or a primary color area for each one. Then they can pick the one they think works best. This is something a traditional illustrator cannot do."

Once Jones completes and saves an image on disk, she takes a photo off the screen using a Nikon camera with a macro lens. She uses Kodachrome professional film, and says the color reproduction is quite good, but not perfect. And, as you can see from the reproduction above, quite good is very good indeed.

'What happens if you don't use paintings as reference points?''

HUBERT HOHN

Hubert Hohn's art may be easy to create technically, but it is very challenging in terms of artistic statement. "I try to raise questions worth asking," says Hohn. "Computer artists tend to emulate existing tools and



Titled or Untitled: A Binary Dump of the Entire Memory of an Apple IIe

existing works of art. We've created electronic paintbrushes. We've made things that look like paintings. I'm exploring what happens if you don't do that. What happens if you don't use paintings as reference points?"

What happens with Hohn is a piece called "Titled or Untitled: A Binary Dump of the Entire Memory of an Apple IIe." This work fills a 12-foot wall with thousands of black computer dots, all encased in large quotes. It also has 64 titles. Each title represents all the different things the artwork can be; the titles are analogous to software. Each piece of software makes the machine different; each of his titles makes you aware of the work as something you can interpret differently.

For this piece, like all of his work, Hohn wrote his own program. But he emphasizes it's a simple program. He says, "It's written in assembly language, the best language to run a printer driver, and it's the printer driver that creates the large printouts."

"An Apple II has 65,536 memory locations. Each location in memory consists of eight bits. Each bit can be either on or off—zero or one. So you get a pattern of zeros and ones

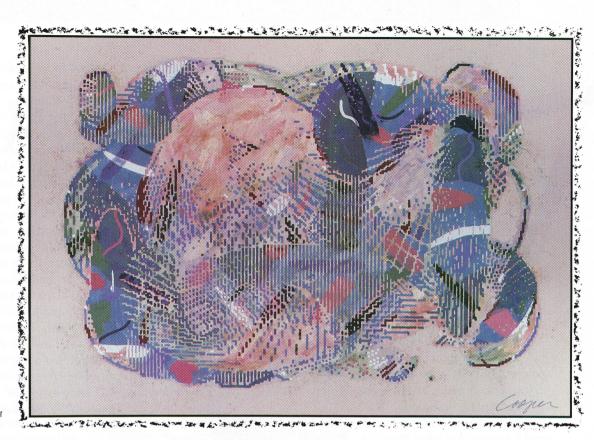
that's eight across; eight switches and each one has to be a zero or a one."

Hohn likes his art to be big. In fact, he likes it to fill whatever wall it hangs on. "I design the zeros and ones depending on how much room there is on the wall. Ideally, I like the piece when it's one page of memory per page of paper."

Hohn's art may strike the viewer as a bit odd, but it's no stranger than how he got into computers. "A friend once borrowed some money," he says. "He paid me back with a washer, dryer and an Apple II. I knew what to do with the washer and dryer, but the Apple II was a mystery."

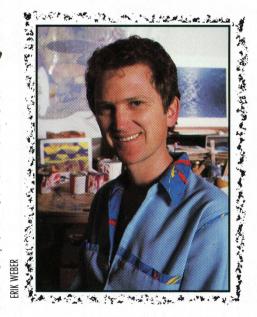
Figuring out the proper use of this mysterious instrument became Hohn's principal preoccupation and it has since become his principal occupation as well—he is director of the Computer Arts Learning Center at the Massachusetts College of Art.

Says Hohn, "Any computer artist worth his or her salt should ask questions about the inherent properties of the medium as a tool. What's the nature of the tool, what's it good for and what does it do?" These questions are addressed in the



Buddha's Basics 44" × 60" Oil on Canvas © 1985 D. Cooper

many titles to Hohn's work. "The art itself emulates the relationship between hardware and software," he says. "The piece is analogous to hardware and the titles are analogous to software." One of the titles is "A Work of Art and a Selection of its Currently Available Software." Explains Hohn, "This means there are 64 titles for this work and for every title, you become conscious of the piece as a different thing." Another title is "A View of the Artist's Work Space." About this title Hohn says, "If you're a digital artist, that's where you work - in the memory of the computer." A third title reads "The Complete Confessions of the Machine." Says Hohn, "If that's everything that's in its mind, there's nothing else to tell. There are no



"I try to describe an intuitive feeling mathematically."



Computers have enabled Dan Cooper to combine his interests in both art and mathematics. Cooper's finished works are colorful creations employing silkscreen painting, printing and watercolor. But to start his works, Cooper always goes back to BASIC.

He writes his own programs using Applesoft BASIC on his Apple II+. For every artistic idea he has, he writes a new program. Cooper starts with an intuitive idea or feeling of what he wants to express, then analyzes it logically. "I try to describe this feeling mathematically," he says. "So I can have the computer create or grow an image that is an outgrowth of the feeling and expresses it."

As the program develops, Cooper runs it and looks at the results on continued on next page

more secrets."





screen. Then he goes back to the program and makes adjustments, elaborations or variations. It is a back and forth experimental process until Cooper gets what he wants.

Cooper's programs always allow the computer a certain freedom of choice within his defined limits. So, every time he runs the program, it produces a different result.

A good example of the way Cooper works is seen in his piece, "Bamboo Too." He says, "I created a program that would grow a forest of bamboo for me. Into my code I built many decisions for the computer to make, based on random choices of numbers-like rolling dice. For example, I instruct the computer to randomly select a number, and if it's a one, the bamboo slants in a certain direction: if it's a two, it slants in another. I also have the computer make choices about width, location and vertical positioning. Because all these choices are made randomly, every time I run the program, I get different results, but within a certain framework."

And there is no end point to his programs—they are an endless process of changing images on the screen. Images are grown on top of one another, or in conjunction with other images. Says Cooper of his role, "What I do is launch it and wait for a moment when all the images crystalize into the perfect expression of what I'm feeling. At that point, I freeze it on the screen. Then if I decide I want to work with it, I print it out on my dot matrix printer."

Up to this point, Cooper works only in black and white. The vivid colors come later. "Even if I had a color screen, there wouldn't be any good way for me to get that color out of the computer and into a finished piece of art as effectively as my technique now works," he says. So with the computer, Cooper thinks only in terms of form, structure, texture, balance, composition and contrast.

From the dot matrix printout, Cooper has his image enlarged onto a clear plastic sheet. This is used to produce a photo-stencil on a stretched silkscreen fabric. It is during the silkscreening process that Cooper gives color to his art. "At this point, I start the creative process all over again," he says. "I figure out how I can color the art, emphasize certain areas and develop a really exciting finished art work that doesn't depend solely on the computer."

Cooper calls his silkscreened computer images serigraphs. He also combines his computer-generated images with hand painting on canvas or paper. The ones on paper he calls monotype. "I can actually print from my computer onto watercolor paper. Then I paint in watercolors on top of it. I get very delicate images that are very spontaneous looking."//

Mard Naman is a free-lance writer who does all his work on an Apple IIe. His work appears occasionally in this magazine.

Many artists consider **Designer's Toolkit** to be the best paint program available for Apple II users. When first developed by artist Lucia Grossberger in 1982 it had many unique features, such as the ability to merge two images into one.

Grossberger says Designer's Toolkit will soon be compatible with several graphics tablets. The program comes with an overlay you place over the tablet; it contains the vast menu of possibilities presented as little colored squares on the overlay.

Twenty colors are defined for you and are permanent. But you can also create your own colors in sets of ten. Then there are the brushes; here again you can define ten brushes of your own at one time. Of course the program draws

the standard lines, circles and geometric figures and fills in as well. There's also the delta function which changes the distance between points in any brush pattern.

You can reverse images or flip them upsidedown; you can rubberstamp images and move them or magnify all or part of your image thousands of times.

Says Grossberger, "I asked, 'what kind of program would I like to use?' Then I made Designer's Toolkit with that in mind."//

GRAPHICS

Fancy Font Works

II Computing's Font Editor and Typer

by MICHAEL J. BIANCALANA, Technical Assistant

You've just finished a super 3-D hi-res bar chart program, but you need a way to label the bars. Or maybe you want a bold title at the top of your latest picture. What if you're designing a game and you want the scores to print out in the top part of the screen?

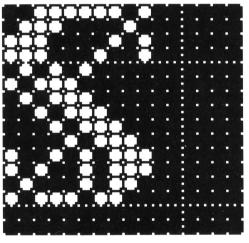
Unlike other computers, the Apple II's ability to mix hi-res graphics and text on the same screen is normally restricted to a four-line text window at the bottom of the screen. You can,

however, get around this limitation and print your text anywhere on the hi-res screen. William Smith provided an interesting solution with his Hi-res Labeler program that appeared in our first issue. Another, more common method uses a *shape font*.

A shape font is a set of hi-res shapes that look like letters and numbers. You can print each one on the hi-res screen using the DRAW or XDRAW command. Because your "text" is really graphics, you can put it anywhere on the hi-res screen, in any of the six available colors. You can also have more than one type size or style—the possibilities are endless.

DRAW and XDRAW are easy enough to use in BASIC—the hard part is creating the letters and numbers in your shape font. That's where Font Editor comes in.

The Font Editor program lets you create and design fonts you can use to print text on the hi-res screen. It automates the relatively complicated procedure of creating shapes that use the up, down,



right and left vector-plotting routines for Applesoft shape tables. Instead of calculating all the vectors yourself, all you have to do is draw them on your Apple's screen.

To use Font Editor, type in the listing from page 44 and check it with TYPOII, or boot it from your Action Disk. It's easy to use: when you run the program, just choose an option from the main menu and follow the

onscreen instructions. (The program expects a data disk in drive 1; if that's not where you want to save your font, be sure to change it, using Option 5.)

Font Editor can be used two ways: to create a new font or to modify an existing font. Since you're starting out without any fonts, you'll want to create one. From the main menu, choose option 3, Edit Font.

You'll see a hi-res screen containing a 16x16 design grid on the left, and an empty table on the right, with one slot for each of the 96 printable characters on the IIe and IIc. A blinking cursor marks your position in the table, and a text window at the bottom of the screen tells you what letter, number or punctuation mark you're working with.

First select the character you want to create: use the arrow keys to position the blinking cursor over the character's position in the table and press RETURN. (If you have an older Apple II with no up-arrow or down-arrow keys, see the accompanying note.) If you are modifying a charac-

continued on next page

GRAPHICS

ter you've already designed, type the I key to imprint the character in the design grid, or the E key to erase it and start from scratch. Since you haven't designed a character yet, type E.

You're now in edit mode, ready to create your character. The blinking dot in the upper left corner of the grid is your design cursor. The arrow keys move the dot within the grid, plotting dots; the dots also appear below the grid in the actual size the character will appear. Use the space bar to switch from plotting to not plotting, or to switch back to plotting again.

After you are satisfied with the shape of your character, press RETURN. The program will scan the grid, assemble the shape vectors and insert your letter into the table—and you're ready to start on the next character.

Once you have defined or partially defined a font, you can return to the main menu by pressing the ESCAPE key and save the font to disk using option 2, Save Font. You can reload it and modify it at any time using option 1, Load Font.

UST YOUR TYPE

Once you've created and saved a font using Font Editor, you can use it to type on hi-res pictures with **Typer.** You can load and save pictures, clear the screen, use any of the hi-res colors for your font and rotate the characters to print horizontally, vertically, diagonally—even upside down.

Type in the Typer program from page 47 in the Software Library, or boot it from the Action Disk. Run the program and load your font, using Option

Instead of calculating all the vectors yourself, all you do is draw them on your Apple's screen.

5. Then clear the screen with Option 4 and use Option 3 to start working on it. You'll see a flashing star—the Typer cursor—and you're ready to type.

The first thing you'll want to do is change the color, using Control-B; since the screen and font color both begin as white, if you don't change the color you'll never see what you type. There are six color choices: 1 is green, 2 is purple, 3 is white, 4 is black, 5 is orange and 6 is blue.

Typer moves the cursor as you type—but only one dot at a time, from left to right across the screen. Use Control-I to change that to a larger value—up to 18 dots per character. Control-R lets you change the rotation of the character, for vertical,

diagonal, or upside-down typing. Finally, Control-Q returns you to the main menu, where you can save your picture, load a new picture to add typing to, or perform other functions.

Once you've used your font, you may want to make changes or corrections to it—easily done using the Font Editor. Even further refinements are possible, such as proportionally spaced fonts (though you'll have to beef up the program to do that).

Try creating different fonts, and experiment with how they look. Use them for games and other soft-

You can print your text anywhere on the hi-res screen.

ware you write yourself. A shape font can make your charts, pictures and other hi-res screens look better than ever—and looking good is what hi-res graphics is all about.

T YPE TIPS

A font is a set of characters that are all the same size and style. For best results you should probably use an already available type face as a model. You can find a good source of model fonts at your local art supply store; ask for a catalog of rub off lettering styles.

Look carefully at each letter and think about how it will break down into rows and columns of dots. For the more complicated ones, sit down and graph them out on paper. Once you've got a design that resembles the original as closely as possible, run the Font Editor and place the dots in the design grid to correspond with your graph on the paper.

Begin each letter on the same baseline, and try to use the same height and width for each character. Use a ruler to measure the letters—professional type designers depend on measuring to get their proportions right. And remember to ESCape to the main menu every now and then to save the font you're working on.

Designing a font takes time, but the longer you work with Font Editor, the faster you'll get—and the better your fonts will look.

OTE FOR APPLE II AND II + OWNERS:

There aren't any up- or down-arrow keys on the II and II + keyboards. To be able to move the cursor up and down, make these changes to the programs:

continued on next page

GRAPHICS

FONT.EDITOR:

280 IN = (((K = 136) * -1) + (K = 149)+ ((K = 140) * 10) + ((K = 143) * -10)): IF SH + IN × 1 OR SH + IN > 96 THEN IN = 0:GOTO 240

TYPER:

Once these changes are made you can use Control-O instead of the up-arrow key, and Control-L for the down-arrow key. //



MOVE - RETURN WHEN FINISHED ARROWS TO TOGGLES MOVE/PLOT SPACE BAR

This program is also available on this month's Softstrip. See page 42 for details.

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A/D SPECIFICATIONS 0.3% accuracy

- On-board memory
- Fast conversion (.078 MS per channel)
 A/D process totally transparent to Apple (looks like memory)
- User programmable input ranges are 0 to 10 volts, 0 to 5, -5 to +5, -2.5 to +2.5, -5 to 0, -10 to 0.

The A/D process takes place on a continuous channel sequencing basis. Data is automatically transferred to its proper location in the on-board RAM. No A/D converter could be easier to use.

D/A SPECIFICATIONS

- 0.3% accuracy
 On-board memory
 On-board output buffer amps can drive 5 MA
- drive 5 MA

 D/A process is totally transparent to
 the Apple (just poke the data)

 Fast conversion (.003 MS per channel)
 User programmable output ranges are
 0 to 5 volts and 0 to 10 volts

0 to 5 volts and 0 to 10 volts
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1/0 32

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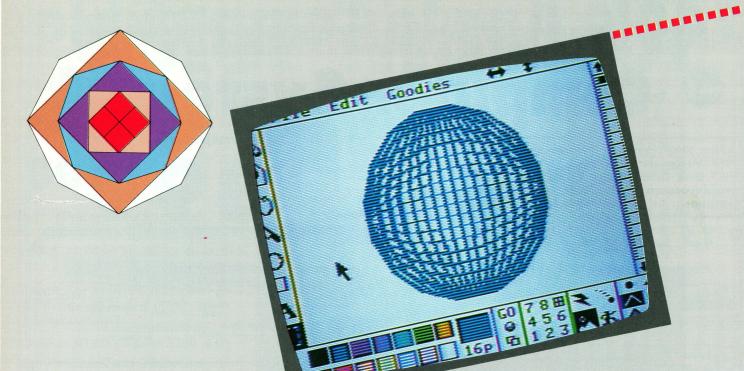
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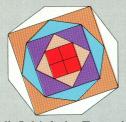
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HANTAVISION BRICKERY

by SCOTT ANDERSON

antavision is being hailed as a breakthrough program in computer animation. Just its demo alone offers a splendid show of colorful images gliding about the screen. We asked Fantavision creator Scott Anderson to share with II Computing's readers some tips and "tricks" that he's particularly fond of. Have fun with Fantavision and let us know of any tricks you discover.—The Editors.



irst of all, I think the Fantavision manual is a great place to begin. Written by Gary Carlston and Kay Wayland, it breaks with tradition by being both readable and informative. It contains dozens of revealing examples and I recommend it for newcomers. In this article I add to those examples, assuming you have scanned the manual.

First we need a brief, almost painless introduction to some technical stuff. Fantavision works with pictures (like frames in a movie) that are composed of objects. These objects can be solid areas, lines or dots. Given two frames, Fantavision can create up to 64 in-between frames called "tweens." These tweens seduce the eye into perceiving motion from a sequence of stills. The best part is that you don't have to draw those 64 frames. That kind of drudgery is a computer's idea of FUN!

Fantavision uses two high resolution graphics screens to create smooth motion. While one screen is being displayed, the other is being erased, recalculated and drawn, one object at a time. When the frame is complete, the display switches. While the new frame is displayed, the other screen is redrawn. This process is "screen flipping" and many Apple games use it to eliminate flicker.

SPEED TRICKS

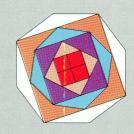
Zoom Command: The Apple's clock ticks one million times per second. That is pretty fast, but if you want to sling thousands of bytes around, it's merely adequate. When Fantavision fills an area with color, it moves thousands of bytes, so large objects may move slowly. One way to speed things is to scale the size of the objects. Use the Zoom command to shrink captured objects or the entire frame. Similarly, use smaller dots for an extra boost.

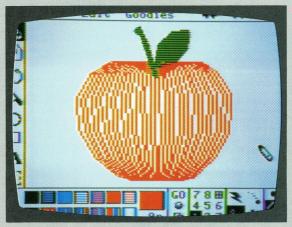
Lightning Mode: Since objects in this mode are not erased, they can move faster. When the screen flips, these unerased objects cause a flashing display. This is a great special effect (especially if you want to create seizures in the audience), but inappropriate for strict animation. There are two cases where this is not a problem:

1. If an object is already being erased by an underlying (lower numbered) object, it will not flicker. For example, a frog's eye need not be erased if the frog underneath is being animated. When the frog is redrawn it will automatically erase the eye, so put the eye in lightning mode.

Background Mode: If an object doesn't change, it can be "dropped" into the background. A face might be divided into two objects: the top of the head and the jaw. To make the face talk, only the jaw must move—the rest of the face can be dropped into the background. If you have a simple background, you can even "pick up" this object. Paste it twice into a frame, put the lowest object into background mode and set it to the background color. Now the top object can be animated as usual.

Keep it simple. The more points





2. An object needn't be erased if it obscures its former self. That is, a static object will not flicker because the same image is in both screens. Static objects, like jail bars or a lamp post, are most useful as a foreground. However, the same technique works with motion, provided that each new object completely overlaps the old one. This usually implies some kind of scaleup. Indeed, Zooming out goes much faster in lightning mode. Zooming in will flicker like mad though, and should be done in normal animate mode.

an object has, the slower it moves. Motion can compensate for some of the resolution loss. Also, the routines to fill a polygon prefer flattened objects. For a given area, a horizontal object will move faster than a vertical one.

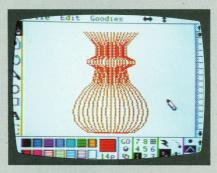
When you need small circles, use dots. The circle mode uses sixteen points to make the circle, so it is guaranteed to be slower. And you get an extra bonus with dots. While you can only get one circle per object, you can have up to 32 dots per object.

final speed tip involves hardware. There are several accelerators for the Apple. Some replace the CPU and others are cards you plug into a slot. They can speed things up by a factor of two or three. Not only do they produce superbly smooth animation, but they can improve the performance of your other software as well.

SPECIAL EFFECTS

3-D Rotation: You can make a simulation of a 3-D rotation with the Flip command. Type some text near the center of the screen. Clone that frame, then flip it. When you run

the movie, the text will appear to rotate in space. This is a great way to title your home videos. Have one line at a time flip, then drop into the background; it's really a cheap shot, requiring only a few mouse clicks and no drawing at all.



Fantavision doesn't have to animate everything, though. Tweening in the trace or background mode can create some pretty wild paintings. To create a dimensional vase, draw its left edge near the center of the screen with a line in background mode. Clone the frame and flip it left-right. When you run this movie, the speed will determine the num-

ber of tweens. Similarly, an apple can be created by drawing the left edge in one frame and the right edge in the next frame.

Make A Globe: To create a globe, draw a circle with a line in background mode. Capture it and copy it to the clipboard. Paste it into frame two and flip it horizontally. Copy this object and paste it into frame three. Flip it vertically. Leave frame four blank. When you run this movie it paints a grid on a globe. Flipping and moving circles can create some simple slinky effects.

Any tweened image can be pasted into your movie. This is useful for creating more subtle motions. Just run the movie, use the space bar to get to the desired tween, then press ESC to stop the movie. The last viewed frame is now on the clipboard, ready to PASTE.

You can increase the number of line objects by using segments. Select line mode and then choose the segment count, from one to nine. For instance, you can have 16 lines with two segments or eight lines with four segments. The product of lines and segments can go up to 32 for each object. This is the ideal way to draw spider legs and stick men.

Several enhancements to Fantavision are in the offing: An animation language will allow you to incorporate movies into your own programs; a telecommunications package will allow users to send real-time movies over the phone.

We respond to your suggestions, so keep those cards and disks coming in. Experiment and have fun!//

Scott Anderson is the author of Fantavision and lives in Sonoma County with his wife Candyce. Fantavision blends two of his passions—art and computers.

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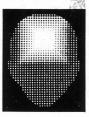
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"Did You Do That?"

Real World Video in Your Apple

by ROBERT GROSSBLATT

any Apple owners know that drawing hi-res pictures can be as habit forming as eating peanuts. There are few things more satisfying than seeing the result of your creative effort either inching its way out of your printer or up there on the screen of a giant color TV set. No doubt about it, graphics are a goof.

Now, light pens, graphic tablets and sophisticated software can make it relatively painless and inexpensive to generate exotic images. But all these things were designed to help you go from your Apple to printed copies and pic-

tures on your monitor. If you wanted to go from the real world of live subjects to your Apple, you had to spend a lot of money for some special hardware.

Well, all that has changed. For a modest outlay of cash, you now can transfer any video image to the hires screen, BSAVE as a standard picture and manipulate it with your favorite graphic software. Just imagine all of the wild possibilities—making title frames for home videos,

doing a little electronic plastic surgery on your own video image—the mind boggles!

THE DIGITIZING PROCESS

But before you can understand how this is done, you have to know something about video in general. The picture on your TV is sent to the screen one horizontal line at a time.

are a goof. screen one horizontal line at a time. The brightness of a

This image was captured from a movie on TV using the AFG-II.

The line is drawn left to right and is immediately followed by a horizontal sync pulse that makes the electron beam move down one line and go back to the left edge of the screen. After 1/60th of a second, the final line has been drawn on the bottom of the screen and a whole frame of video has been received. A vertical sync pulse causes the beam to move to the upper left and the whole process starts again.

Any hardware that transfers a

video image to the hi-res screen has to look at the sync pulses to know where each horizontal line starts and where each complete frame ends. Recognizing sync is the hardware's first step in getting video images into an Apple; the next is to *digitize* the image.

Real world video uses the entire gray scale to produce a TV image. The brightness of any one dot on the

screen is a direct function of the strength of the video signal when the electron gun reaches that point on the line. The dots, or pixels, on the hi-res screen, however, can only be black (off) or white (on). In order for the Apple to show

a video image, the shades of gray in the original image must be translated to either black or white. This process is called *digitizing*.

Even though the Apple can't display shades of gray, it can represent them in the same way pictures are printed in a newspaper. If you look closely at a newspaper photograph, you see that it's made up of closely spaced black dots. The same thing is done on the Apple. By filling an area with closely spaced black and

white dots, the hi-res screen gives the illusion of gray.

This method of representing the gray scale causes messy-looking images on a color monitor or TV. The problem happens because the Apple uses the pixel position to generate color on the screen. Perhaps you've seen this with some commercial graphics software. If you draw a solid red box, for example, and use the software's command to move the image across the screen one pixel at a time, you see the box change color. Since a digitized image is really a black-and-white line drawing, the color of any particular dot on the screen is going to depend on which pixel was turned on. The bottom line in all this is that while you can see the images on a color screen, this is one of those rare times when it's better to use a monochrome monitor.

THE RESOLUTION

Once you've digitized the image, you can put it in the computer's memory and display it on the hi-res screen. Just how this is done depends on the technique used to digitize the incoming video. The picture can be built up a little at a time by sampling the video signal, digitizing the sample and then moving the result to the hi-res screen. This is called "slow scan" video imaging. The other approach-"real time" imagingmeans just that. Each horizontal line is sampled and digitized so quickly that it can be sent to the hi-res screen before the next line starts. Whatever you see on your TV will show up at the same time on your Apple's monitor.

Of course the monitor's resolution of the image won't compare to the TV's. The standard Apple hi-res screen is a field of 280 by 192 discrete pixels and the double hi-res screen is made up of 560 by 192 pixels. Even though you can get twice the resolution on the latter, it's nowhere near the image quality possible with a real video signal.

Now that we understand the theory behind video imaging, let's see how to go about doing it. The author scanned a photograph with Computereyes to produce this image.



THE SLOW SCANNER

Digital Vision's **Computereyes** is an inexpensive slow scan device available in versions for the Apple II series or the IIc. A nice feature of the II series version is that it connects to the internal game port rather than occupying an expansion slot. If your Apple is anything like mine, free slots are at a premium.

Computereyes is a small box with an RCA jack on the back that can be connected to any standard video output such as a VCR, video camera, or video disc player. With two knobs on the front of the box you adjust the sync and brightness. You use the sync control to lock the sync from the video source with the circuitry in the box. The brightness control sets the threshold level against which the incoming video will be referenced. If the incoming video signal level is less than the threshold the pixel will be shown on the Apple screen as a black pixel and if the signal is greater than the threshold the pixel will be white.

The software that drives the system runs under both DOS 3.3 and ProDOS. When the disk is booted, you're asked to choose an operating system; the menu selections that follow your choice are identical.

You adjust the sync by selecting that option from the main menu and turning the knob in the direction indicated by an on-screen arrow. Alter the brightness by capturing a video image and looking at the results. Choosing "Normal Capture" from the menu switches the display to hi-res and the image builds up from left to right.

Remember that this is a slow scan

device and it starts digitizing by looking at the first bit of video in each horizontal line and sending the result to the hi-res screen. On each successive frame of incoming video, it looks at the next column of pixels and digitizes that. Since one column is digitized during every frame of video and there are 280 columns on the hi-res page, the image is completed in 280 times 1/60th of a second—about 4.7 seconds.

A normal capture results in a very high contrast image since only one threshold level is used to digitize the image. Computereyes can handle the gray scale by doing several scans of the image while increasing the threshold level for each scan. The digitized images are merged and the software decides how many pixels to turn on. The more pixels turned on in any given area, the lighter that area of the image is. Both a fourand eight-level scan can be selected from the menu. It takes about 20 seconds for the former and about 40 seconds for the latter.

You can save the final displayed pictures to disk and there's an option to pack them so they take up less room. Since Computereyes is a hardware/software package (neither one works without the other), the software will save your pictures in either ProDOS or DOS 3.3 format. Digital Vision also has optional software that saves the images in files compatible with both Springboard Software's Newsroom and Broderbund's Print Shop.

If you have an Apple IIe with an extended 80-column board you can use the enhanced software package to save your pictures in the double hi-res format. And since all pictures are stored in a standard Apple format, you can load them into graphics packages such as Apple Computer's Mouse Paint or Broderbund's Dazzle Draw and let your creative urges run wild.

The strength of a slow scan system is that it can take its time to build gray scale images. The disadvantage is that it can only work with static images. If you connect a video camera to Computereyes, you're a

continued on next page

bit limited in the images you can digitize. A still life is fine, but pets and children will be a problem. The only way around it is to record the image and then digitize a freeze frame from your VCR.

THE FAST SCANNER

Moving images are best handled by using a real time digitizer, and that's exactly what you get with the **AFG-II** from Micro Mainframe. This plug in card can live in any expansion slot except slot 0 in a II or II + and the auxiliary slot of a IIe. Unfortunately, no IIc version is available.

The secret behind real time imaging is speed. Each line of video has to be digitized and sent to the hi-res screen before the next line starts. Micro Mainframe has managed this by doing 99 percent of the work in hardware. As a matter of fact, you can make the card work with a two line BASIC program! There's an RCA jack on the card that connects to a video source as well as five board mounted controls to adjust the brightness, contrast, and so on.

Using the AFG-II couldn't be easier. All you do is connect it to a video source, plug the card in your Apple, and boot the disk. The software expects the card to be in slot 3, but that can be changed by running the menu driven configuration program. Once that's done you can turn the card on by selecting option 1 from the main menu. The disk drive will turn on, the program will load in—and you'll be amazed. There up on your monitor will be an Apple version of the program you're watching on TV!

There is a whole slew of controls available as you watch the screen: you can freeze the image by pressing "W," switch back and forth from gray scale to high contrast by pressing "M," see the picture as a negative by pressing "I." And you can even put titles anywhere on the image using any one of several character sets—it's really that simple!

The amount of graphic manipulation you can do to a captured image depends on what type of Apple you're using. You need a He with an extended 80-column card to

do things like zoom in on a part of the frozen image or display double hi-res. But any variety of Apple will let you put titles on the image, display it as a negative, save it to disk or print it out.

Micro Mainframe includes two other neat features in the software. The first is a program to create a slide show out of the captured images (or any standard hi-res pictures), and the second is a routine to print poster-sized copies of your image. It does this particular piece of hocuspocus by multiplying the graphic by a factor of eight and printing each piece separately. All you do is tell the program which image you want to print, turn on your printer and get the world's biggest roll of scotch tape.

The AFG-II won't produce as good a gray scale image on a monitor as Computereyes does since it has to handle each image in real time. You can tell the AFG-II to ignore gray scale and you'll be looking at images that are similar to those gotten with a normal capture using Computereyes. If you consider how quickly the AFG-II has to get things into your Apple's memory, the gray scale representation is impressive, but if you want the better quality, you're better off with Computereyes.

The choice of getting a real time or slow scan digitizer depends on what you want to do with it. No matter which product you get, I guarantee it'll suggest a whole new world of graphic possibilities. Once you've captured a video image with either type of digitizer, you can manipulate it with your favorite graphic utility. If you don't have a favorite, take a look at the illustrations accompanying this article. All the titles and artwork were done with Fontrix from Data Transforms.

"CLEANING UP" THE IMAGE

If you want to generate truly eyeopening digitized video images your work isn't finished after you've captured an image. There's always a certain amount of cleaning up to do. Getting rid of busy backgrounds, fixing the shape of your nose, and adding more hair are only a few of The Statue of Liberty was captured from the TV with the AFG-II. Text was added with Fontrix.



the things you can do to "improve" real world images. Fontrix will let you use any kind of graphic aid you want, from the keyboard to joysticks to tablets, and you can choose from over a hundred different alphabetic and graphic fonts to enhance the image any way you want.

Once you've completed an image you're happy with, you can load it in under either the Micro Mainframe or Computereyes software. The former lets you do a poster-sized print and with the latter you can resave the image to use in Printshop or Newsroom. Or you can use Fontrix to print the image.

Fontrix lets you crop, magnify and rotate the image as well as alter the gray scale rendition in the printed copy. And if you have any Okidata printer, Fontrix has the best driver I've seen for printing graphics—no white strips between lines!

You can print out of the Micro Mainframe software, but it only supports Epson and C. Itoh printers. Instructions tell you how to write a printer driver for your own printer, but it's a lot easier to use Fontrix.

Although both these digitizers capture real world images, each is best suited to a particular job. And while we're not talking about an overwhelming amount of cash outlay, you should carefully analyze your needs before reaching for your wallet. You don't have to be a video wizard to use any of these things—as a matter of fact, it's hard to make a mistake.

Creating slick pictures does take time and energy. Graphic software can make it a bit easier but, in the end, it's hard work that yields striking results. And after you've finished an image it's great if everyone's jaw drops upon seeing it. Being able to capture real world images and use them in your own pictures is a sure way to guarantee results. People will look at them, look at you and say the magic words: "Did you do that?"//

Robert Grossblatt contributes to **Radio Electronics** and other publications. He lives in New York City.

PRODUCT INFORMATION

AFG-II

Micro Mainframe 11285 E. Sunrise Gold Circle Rancho Cordova, CA 95670 (916) 635-3997 \$249.99 CIRCLE 221 ON READER SERVICE CARD

Computereyes

Digital Vision, Inc.
14 Oak St. Suite 2
Needham, MA 02192
(617) 444-9040
S120.95
with b&w video camera,
\$399.95
CIRCLE 222 ON READER SERVICE CARD

Here are other digitizers that perform similarly to those mentioned in this article.

Computech Diplomat

(frame grabber)
Computech Systems
P.O. Box 4748
Foster City, CA 94404
(415) 345-0159
S295 for Apple II+, \$495 for IIe
CIRCLE 223 ON READER SERVICE CARD

MicronEye Bullet (slow scan, includes non-standard camera)
Micron Technology, Inc.
2805 E. Columbia Road
Boise, ID 83706
(208) 386-3800
\$295
CIRCLE 224 ON READER SERVICE CARD

Micro Works DS-65 (slow scan)
Micro Works
P.O. Box 1110
Del Mar, CA 92014
(614) 942-2400.
\$349.95
CIRCLE 225 ON READER SERVICE CARD

Additional Products Mentioned:

Dazzle Draw

Broderbund Software 17 Paul Drive San Rafael, CA 94903 (415) 479-1170 \$59.95 CIRCLE 218 ON READER SERVICE CARD

Print Shop

Broderbund Software 17 Paul Drive San Rafael, CA 94903 (415) 479-1170 \$49.95 CIRCLE 227 ON READER SERVICE CARD

Fontrix

Data Transforms
616 Washington St. #106
Denver, CO 80203
(303) 832-1501
\$95
CIRCLE 228 ON READER SERVICE CARD

Mouse Paint

Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010 Comes free with purchase of mouse. CIRCLE 229 ON READER SERVICE CARD

The Newsroom

Springboard Software Inc. 7807 Creekridge Circle Minneapolis, MN 55435 (612) 944-3912 \$49.95 CIRCLE 230 ON READER SERVICE CARD

Putting Images Back on Videotape

Getting video images out of your Apple is a lot easier than getting them in. After all, that's what comes out of the video jack on the back of your computer. I use a monochrome monitor to do a lot of serious work on my Apple but every once in a while, when I'm sure that no one's around, I wheel the computer over to my 25" color TV, plug in my joystick and blast aliens for a few hours.

Occasionally I run the output of the computer through my VCR and record my usually feeble attempts at saving the earth so I can get a delayed sort of instant replay by watching the tape. If you do the same thing you'll find that there's something strange about the video that comes out of your Apple. Freeze frames, speedups and slow motion are jittery—any kind of video effect is a little flakey.

The reason for this has to do with something called interlace. As you watch your favorite TV program, you never see a complete frame at any one time. The picture you're watching is made of 525 separate horizontal lines that are painted on the picture tube from top to bottom. But you never see all of them at once.

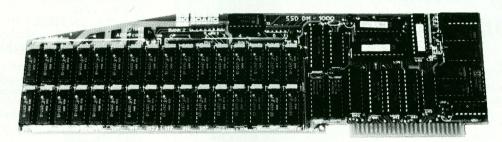
Each TV frame consists of two "fields." One field draws the evennumbered lines on the screen and the other draws the oddnumbered lines. Each field is drawn in 1/30th of a second so a complete frame is finished every 60th of a second. Both fields have the same number of lines—262½. Apples don't generate interlaced video. They produce 262 lines of video, 192 visible ones and 70 blank ones, and then follow that with a vertical sync pulse. The missing half line is the problem.

In regular video, one field has the half line just before vertical sync and the other has it immediately afterwards. Video special effects generators use the position of these half lines (relative to vertical sync) to know which field is being drawn. Since the Apple produces an even number of lines, the effects generators usually get confused.

But don't give up hope. As long as you stay away from special effects, you won't have any trouble recording the images from your Apple on a VCR. You can use any one of the products we've mentioned here to capture a video image on your computer screen, manipulate it with a software package like Fontrix and transfer the image to videotape by connecting your Apple output to the video input of your VCR.

This will let you make title "slides" and other interesting bits of business for your home videotapes. It may be a bit of work, but the results can be absolutely mindblowing.//

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PCPI Applicand is also available. Plus-works XM software transforms Appleworks to operate on your Apple II + and to expand your desktop with BIG BOARD up to 1024K!!!

*System requirements: Appleworks, Apple II +, PlusWorks XM, BIG BOARD, 80 column card, one wire shift key modification.

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CIRCLE 012 ON READERS SERVICE CARD

SOFTWARE LIBRARY

Il Computing's type-in listing section includes every full-length program from this issue. We've included them all together for your convenience. It will be easy for you to remove these pages and save them in a binder if you wish. All of the following programs work with DOS 3.3 and ProDos.

—Type Your Program Once!	
	57
This program helps you catch all typos. See page 43 for accompanying article.	
—Fancy Font Works	
FONT EDITOR	4
TYPER	17
-Picture Packing	
HEX ENTRY	10
II PAC	
GRAFIX	O
—A Graphics Primer	
GRAPHICS DEMO	52
—Tales from the Crypt (Part 5)	
CRYPT.005	54
—Screen Test	
SCREEN TEST	56
Important Notice For Action Disk Buyers	58
NOTE: If you have the Action Disk version of II Computing , you can use all these programs immediately. Just follow the instructions in the corresponding articles.	

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JUNE / JULY 1986

Softstrip from Cauzin Systems

This Cauzin Softstrip contains the Font Editor and Screen Typer programs from Michael Biancalana's article "Fancy Font Works" on page 27. The two files are named FONT.EDITOR and TYPER. In addition, the Softstrip contains a sample font to use with the programs, called BROADWAY.

You can read the Softstrip directly into your Apple II, II+, IIe or IIc with a Cauzin Softstrip Reader, which can also read the Softstrips that appear in other books and magazines. The Softstrip Reader costs \$199, and is available from any Cauzin dealer.

If you don't own a Softstrip Reader, just bring this issue of *II Computing* and a formatted DOS 3.3 or ProDOS disk to your Cauzin dealer. The dealer will transfer the files from Softstrip to disk free of charge, and you'll see how easy getting software out of a magazine can be.

For the address of the Cauzin Softstrip dealer nearest you, call Cauzin Systems toll-free at 1-800-533-7323 or, in Connecticut, (203) 573-0150. Be sure to tell the operator that you need the name of a dealer who's equipped to copy the Softstrip onto your Apple II disk.//

2

3

Softstrip

TYPO II (TYPE YOUR PROGRAM ONCE)

Nothing is more frustrating than typing in a long program, only to find it doesn't work. At *II Computing* we are careful to test each program listing before publication, and all listings are computer generated, so they should be accurate.

Therefore, if your typed-in program doesn't work, you probably made a typing error. Fortunately, if you use TYPO II, it's easy to find and fix most of those mistakes.

TYPO II is a program that verifies your typing accuracy after you enter BASIC listings from our magazine. TYPO is an acronym for "Type Your Program Once." We will use this program to help you with BASIC listings in all future issues of *II Computing*.

With TYPO II, you have two ways to check your work. (1) It generates a two-letter code for each program line. This protects against misstrikes, transpositions, dropouts and extra characters. (2) It generates a total checksum for the whole program that requires all lines to be correct and in the correct order.

	PRO6	RAM: S	AMPLE	CODES		
CODE	LINE#	CODE	LINE#	CODE	LINE#	
SI	10	SF	40	SH	70	
MS	20	67	50	DS	80	
PΔ	70	CT	40	NU	90	

TOTAL CHECKSUM = 315162

When you use TYPO II on your program, you should get the same line codes and checksum that appear for that program in the magazine. If you don't, there is a typing error in the line or lines where your codes and ours do not agree.

IMPORTANT: TYPO II works with Applesoft BASIC running with DOS 3.3 or ProDOS. It does not work with Integer BASIC. Correct spacing is very important. Applesoft automatically inserts one space after each REM or DATA command, so keep this in mind when entering your lines. Check spacing first when line codes do not agree.

HERE'S WHAT YOU DO

- 1. Load DOS 3.3 or ProDOS into memory, then insert a formatted disk in your disk drive.
- 2. When you see the symbol], you are in Applesoft BASIC. Proceed to type in the TYPO MAKER program from this magazine (see listing on page 57). You only need to do this once; thereafter you load TYPO II from your disk. Note: ProDOS does not permit spaces in file names, so enter TYPO II as TYPOII, and TYPO II MAKER as TYPOII.MAKER.
- 3. Verify this program carefully the old way. It is possible to use TYPO II to check itself, but this would cause

more problems than it's worth.

- **4.** Now, run the TYPOII.MAKER program. This saves a text "command" file named TYPOII on your disk. Your Apple executes this command file just as if you entered it from your keyboard. Also, the "maker" program creates a binary file for its assembly language routine. For protection, make an extra copy on a different formatted disk by running TYPOII.MAKER again.
- **5.** Type in any BASIC program from our magazine, including spaces as indicated and complete REM statements for all lines requiring them.
- **6.** Remember: Always save your typed-in program to disk before you run it. This backup file helps protect you against mistakes, power loss, misunderstood instructions, computer lockup, and so on.
- 7. Then type EXEC TYPOII (return). You have now loaded the TYPOII command file from disk. The letter codes are displayed vertically on the screen next to their corresponding line numbers. You can see them again by typing the command RUN 63000 (return). To pause and restart display, type (control)-S simultaneously.
- 8. Compare your line codes and checksum to those in the magazine. If your line code is different from the code in the magazine, you have made a typing error on that line. The final checksum will not agree until every line code in the program matches those printed. There is a remote possibility that all line codes will agree, but the final checksum will not. This can happen when errors occur in a line that generates the same letter codes as the correct line, and the two errors cancel each other out.
- 9. To correct a specific line, type LIST (line number) (return). You can then edit and correct that line. Occasionally, the line may appear to be absolutely correct, but the line codes will not agree. This is probably due to typing a control character that does not appear on the screen. Retype the entire line and try again. When you have made all corrections, type RUN 63000 (return).
- **10.** Repeat the process of comparing and correcting until all the codes and checksums agree.
- **11.** Delete TYPOII from your now corrected program with the command DEL 63000,63150 (return).
- **12.** SAVE your program to disk, and delete the uncorrected backup file from your disk.

To use TYPO II with subsequent programs, call TYPO II from disk after typing in your program by entering the command EXEC TYPOII (return). This appends TYPO II to your program and runs it on all program lines lower than 63000. //

JUNE / JULY 1986

FONT EDITOR

Article on page 27

```
RFM
         * FONT EDITOR
    REM
        * BY MICHAEL J. BIANCAL
    ANA
        * (C) 1986 ANTIC PUBLIS
30
   REM
    HING, INC.
40
        * II COMPUTING VOL.1 N
   REM
    0.5
50
   ONERR GOTO 1120
   GOSUB 1210
60
70 GOSUB 1150
   REM * LOAD FONT
   HOME : INPUT "NAME OF FONT?
    "; F$
   IF FS = "" THEN RETURN
100
110 PRINT DS; "BLOAD "FS", A$6100
120 N1 = 1:N2 = 10:X = 110:Y = 0
    : POKE 232,0: POKE 233,97
130
    GOSUB 1340: RETURN
    REM * SAVE FONT
    HOME : INPUT "NAME OF FONT?
     ": F$
160 IF FS = "" THEN RETURN
170 LN = 2 + PEEK (ST + 202) +
    PEEK (ST + 203) * T
   PRINT D$; "BSAVE "F$", S"SL",
    D"DR", A$6100, L"LN
   RETURN
200 REM * EDIT FONT
   POKE - 16304,0: POKE
    297,0:SH = 1:X = 110:Y = 0: POKE
    233,96:Z = FRE(0): FOR Z =
    128 TO 1 STEP
                  -1:V(2) = 0:
     NEXT Z:Z = 1
    HOME: VTAB 23: FOR I = 1 TO
    39: PRINT "=";: NEXT : PRINT
230 VTAB 24: PRINT "USE ARROWS
    TO SELECT CHARACTER"
    FOR I = 0 TO 15 STEP 3: XDRAW
    1 AT X,Y + I: NEXT I:K = PEEK
    ( - 16384): POKE
                     - 16368,0:
```

```
IF K < 128 THEN FOR I = 0 TO
    15 STEP 3: XDRAW 1 AT X.Y +
    I: NEXT I: GOTO 240
    FOR I - 0 TO 15 STEP 3: XDRAW
    1 AT X,Y + I: NEXT I
    IF K = 141 THEN 320
270 IF K = 155 THEN RETURN
280 IN = (((K = 136) *
                        -1) + (
    K = 149) + ((K = 138) * 10) +
    ((K = 139) * - 10)): IF SH +
    IN < 1 OR SH + IN > 96 THEN
    IN - 0: GOTO 240
290 SH = SH + IN:X = 110 + 16 *
    ((SH - 1) - 10 * INT ((SH -
    1) / 10)):Y = 16 *
                        INT ((SH
     - 1) / 10)
300 UTAB 21: PRINT "THE '" CHR$
    (SH + 31)"' KEY"
310 GOTO 240
320 XS = X:YS = Y
330 POKE 232,0: POKE 233,97
340 XDRAW SH AT 45,120
350 VTAB 23: PRINT "<1>MPRINT D
    R <E>RASE CHARACTER?": GET K
    $: POKE - 16368, Ø: IF K$ =
    "I" THEN 380
    IF K$ < > "E" THEN XDRAW
    SH AT 45,120: POKE 233,96: GOTO
370 XDRAW SH AT 45,120: GOTO 44
380 POKE 232,0: POKE 233,96
    FOR I = \emptyset TO 15: FOR J = \emptyset TO
    15 STEP 1: XDRAW 3 AT 45 + J
    ,120 + I:P = PEEK (234): XDRAW
    3 AT 45 + J,120 + I
    IF P THEN 420
400
410 DRAW 2 AT (J * 6) + 3,(I *
    6) + 2
420 NEXT J, I
           * INPUT ROUTINE
     POKE 232,0: POKE 233,96
```

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It's true when you subscribe to *II Computing's* ACTION EDITION! Every issue will contain programs for Education, Adventure, Utilities, Business and more. Instead of keyboard frustrations and program debugging, all you have to do is Load and Go! Find out more details in the easy-order Subscription forms in this issue.

Plus three Public Domain programs on this issue's Action Disk: Wavescape, The Gorilla and Label Printer

UTAB 23: PRINT "ARROWS TO M 450 OVE - RETURN WHEN FINISHED": VTAB 24: PRINT "SPACE BAR T OGGLES MOVE/PLOT " 460 X = 3:Y = 2:X1 = 45:Y1 = 120 :M = 1: XDRAW 2 AT X,Y: XDRAW 3 AT X1, Y1 XDRAW 3 AT X1, Y1: XDRAW 2 AT X,Y:P = PEEK (234)480 K = PEEK (- 16384) 490 IF K < 128 THEN XDRAW 2 AT X.Y: XDRAW 3 AT X1.Y1: GOTO POKE -16368,0: IF K = 155500 **THEN 600** IF K = 141 THEN GOTO 610 510 IF K = 160 THEN M = ((M = 1)520) - 1) + (((M = 0) + 1) * (M- 0) * 1) IF M = 1 AND P = 0 THEN XDRAW 2 AT X,Y: XDRAW 3 AT X1,Y1 IF M = 0 AND P > 0 THEN XDRAW 2 AT X,Y: XDRAW 3 AT X1,Y1 550 XX = X:YY = Y $560 \times = \times + ((6 * (K = 149)) - ($ 6 * (K = 136))):Y = Y + ((6 *(K = 138)) - (6 * (K = 139))IF X > 97 OR X < 1 OR Y > 9 570 7 OR Y < 1 THEN X = XX:Y = Y580 X1 = X1 + (X > XX) - (X < XX)): Y1 = Y1 + (Y > YY) - (Y <YY): GOTO 470 590 REM CLEAR GRID HGR : GOSUB 1340: POKE 233, 97: GOTO 210 DRAW 2 AT X, Y: X = 3: Y = 2610 620 FOR J = 0 TO 15 FOR $I = \emptyset$ TO 15: XDRAW 2 AT X + I * 6, Y + J * 6:P = PEEK(234): XDRAW 2 AT X + I * 6, Y + J * 6IF NOT P THEN S(J) = I:I = 640 15 650 NEXT I FOR I = 15 TO Ø STEP - 1: XDRAW 2 AT X + I * 6,Y + J * 6:P = PEEK (234): XDRAW 2 AT X + I * 6, Y + J * 6IF NOT P THEN E(J) = I:I = 670 NEXT I,J 680 FOR J = 1 TO 14 STEP 2 700 S(J) = ((S(J) > S(J + 1)) *S(J + 1)) + ((S(J) < S(J + 1)))) * S(J)) + ((S(J) = S(J +1)) * S(J)):S(J + 1) = ((S(J + 1)) = ((S(J + 1)))) < S(J + 1)) * S(J)) + ((S(J) = S(J + 1)) * S(J)): NEXT710 FOR J = 0 TO 14 STEP 2 720 E(J) = ((E(J) > E(J + 1)) *E(J)) + ((E(J) < E(J + 1)) *E(J + 1)) + ((E(J) = E(J + 1)) * E(J)):E(J + 1) = ((E(J))> E(J + 1)) * E(J)) + ((E(J + 1))) + ((E(J + 1)))

730 NEXT J 740 S(0) = 0FOR $J = \emptyset$ TO 15 STEP 2 750 760 FOR I = S(J) TO E(J): XDRAW 2 AT X + I * 6.Y + J * 6:P = PEEK (234): XDRAW 2 AT X + I * 6.Y + J * 6IF NOT P THEN M = 5 770 780 IF P > Ø THEN M = 1 790 IF I = E(J) THEN M = M + 1800 GOSUB 900 810 NEXT I 820 FOR I = E(J + 1) TO S(J + 1)) STEP - 1: XDRAW 2 AT X + I * 6, Y + (J + 1) * 6:P = PEEK(234): XDRAW 2 AT X + I * 6, Y + (J + 1) * 6IF NOT P THEN M = 7 RRA IF P > 0 THEN M = 3 840 IF I = S(J + 1) THEN M = M -860 GOSUB 900 870 NEXT I,J $880 \ Z = Z + 1: V(Z) = 0$ GOTO 960 890 IF $U(Z) = \emptyset$ THEN U(Z) = M: GOTO 900 950 910 IF U(Z) > Ø AND U(Z) < 8 THEN V(Z) = V(Z) + (M * B): GOTO950 920 IF V(Z) > 7 AND V(Z) < 64 AND $M > \emptyset$ AND M < 4 THEN U(Z) =V(Z) + (M * 64) IF U(Z) > 7 AND U(Z) < 64 AND M > 3 THEN Z = Z + 1:V(Z) =M: GOTO 950 $940\ Z = Z + 1$ 950 RETURN POKE 233,97: XDRAW SH AT XS YS: GOSUB 1450: GOSUB 1520 970 LC = ST + (PEEK (SS) + PEEK (SS + 1) * T) - 1FOR I = 1 TO Z: POKE LC + I 980 , U(I): NEXT I DRAW SH AT XS, YS: GOSUB 134 0: GOTO 210 1000 REM * CATALOG 1010 HOME : PRINT D\$; "CAT,S"SL" , D"DR 1020 PRINT : PRINT "PRESS < RETU RN> TO CONTINUE": GET KS: RETURN 1030 REM * SET DATA DRIVE 1040 HOME : PRINT "THE DATA DRI VE IS DRIVE "DR" IN SLOT "SL 1050 PRINT : PRINT : INPUT "NEW SLOT: "; SL: PRINT : INPUT " DRIVE: "; DR IF SL < 1 OR SL > 7 OR DR < 1 OR DR > 2 THEN PRINT "INU ALID SLOT/DRIVE":SL = 6:DR = 1: PRINT : PRINT "HIT <RETUR N> TO REENTER": GET K\$: GOTO 1040 1070 HOME : PRINT "THE DATA DRI UE IS DRIVE "DR" IN SLOT "SL

: PRINT : PRINT "PRESS < RETU

continued on next page

) = E(J + 1)) * E(J))

RN> TO CONTINUE": GET K\$: RETURN

1080 REM * QUIT PROGRAM

1090 HOME : PRINT : PRINT "ARE
YOU SURE YOU WANT TO QUIT? (
Y/N) ";: GET K\$: IF K\$ = "Y"
THEN HOME : END

1100 RETURN

1110 REM * ERROR HANDLER

1120 PRINT "ERROR " PEEK (222)"
IN LINE " PEEK (218) + PEEK (219) * T

1130 PRINT "PRESS ANY KEY TO CO NTINUE": GET K\$

1140 REM * MAIN MENU

1150 POKE - 16368,0: TEXT: HOME
: VTAB 5: HTAB 12: PRINT "MA
IN MENU": VTAB 8: HTAB 10: PRINT
"<1> LOAD FONT": VTAB 10: HTAB
10: PRINT "<2> SAVE FONT": VTAB
12: HTAB 10: PRINT "<3> EDIT
CHAR"

1170 UTAB 20: HTAB 12: PRINT "S ELECT ONE:";: GET K\$: POKE -16368,0

1180 ON VAL (K\$) GOSUB 90,150, 210,1010,1040,1090

1190 GOTO 1150

1200 REM * INTIALIZE

1210 D\$ = CHR\$ (4):SL = 6:DR = 1:X1 = 1:X2 = 97:Y1 = X1:Y2 = X2:Z = 1:ST = 24576:T = 256

1220 HGR : SCALE= 1: ROT= 1: HCOLOR=

1230 DIM S(16),E(16),V(128) 1240 REM * SHAPE TABLE FOR CU RSOR

1250 FOR I = 0 TO 32: READ SH: POKE 24576 + I,SH: NEXT I

1260 DATA 3,0,8,0,17,0,31,0,45, 45,45,45,45,45,45,45,0,45,21 ,54,30,63,7,32,44,45,54,63,4 4,5,0,5,0

1270 REM * JMP TO MEMOUE

1280 FOR I = 0 TO 4: READ D: POKE 24827 + I,D: NEXT I

1290 DATA 160,0,76,44,254

1300 ST = 24832: POKE ST,100: POKE ST + 1.0

1310 FOR I = 1 TO 101:V = 202 +
(I * 2): POKE ST + (I * 2),V
- INT (V / T) * T: POKE ST
+ (I * 2) + 1, INT (V / T):
NEXT I

1320 FOR I = 25036 TO 25236 STEP 2: POKE I,5: POKE I + 1,0: NEXT

1330 REM PRINT GRID

1340 CALL - 3086:X1 = 1:X2 = 9

7:Y1 = X1:Y2 = X2

1350 FOR X = X1 TO X2 STEP 6 1360 FOR Y = Y1 TO Y2 STEP 6: HPLOT

X,Y: NEXT Y

1370 HPLOT X,1: NEXT X

1380 HPLOT 0,0 TO 98,0 TO 98,98 TO 0,98 TO 0,0

1390 FOR I = 1 TO 97 STEP 3: HPLOT I,25: HPLOT I,85: HPLOT 73,I : NEXT I

1400 N1 = 1:N2 = 10:X = 110:Y = 0: POKE 232,0: POKE 233,97

1410 FOR N = N1 TO N2: DRAW N AT X.Y: IF N = 96 THEN RETURN

1420 X = X + 16: NEXT N 1430 X = 110:Y = Y + 16:N1 = N2 + 1:N2 = N2 + 10

1440 GOTO 1410

1460 IF Z < = OF THEN RETURN

1470 OS = ST + (PEEK (FS) + PEEK (FS + 1) * T):OE = ST + (PEEK (LS) + PEEK (LS + 1) * T) + 2

1480 DF = OE - OS:NS = 16384:NE = NS + DF: GOSUB 1500

1490 NS = OS + OF:OS = 16384:NE = OE + OF:OE = OS + DF

1500 POKE 60, OS - INT (OS / T)

* T: POKE 61, INT (OS / T):

POKE 62, OE - INT (OE / T) *

T: POKE 63, INT (OE / T): POKE
64, NE - INT (NE / T) * T: POKE
65, INT (NE / T): POKE 66, NS

- INT (NS / T) * T: POKE 6

7, INT (NS / T)

1510 CALL 24827: RETURN 1520 FOR I = FS TO LS STEP 2:V = PEEK (I) + PEEK (I + 1) *

T:U = U + OF: POKE I,U - INT (U / T) * T: POKE I + 1, INT (U / T): NEXT I

1530 RETURN

TYPO TABLE II

Code	Line#	Code	Line#	Cc	ode	Line#
RO	10	FH	520	E	J	1030
FA	20	RX	530	E	M	1040
UP	30	RM	540	() H	IM	1050
ZR	40	QE	550	(JK	1060
BK	50	JZ	560	F	K	1070
HC	60	SN	570	1	VI.	1080
HP	70	GI	580		JU	1090
FU	80	ZI	590		VE	1100
LJ	90	MD	600		/ J	1110
NU	100	PR	610	0	as ·	1120
FE	110	AT	620	0	UE	1130
TH	120	BP	630	1	YE	1140
QS	130	WH	640	F	S	1150
JW	140	KQ	650		JM	1160
LJ	150	ZN	660	F	PQ.	1170
NU	160	OM	670		YU	1180
HL	170	BC	680	1	1K	1190
YY	180	BE	690	1	1C	1200

						100
190	EX	700		SQ	1210	
200	BA	710		AR	1220	
210	WLI	720		KB	1230	
220	KS	730		YQ	1240	
230	RF	740		ST	1250	
240	BH	750		SA	1260	
250	OX	760		GC	1270	
260	IJ	770		RM	1280	
270		780		DW	1290	
280	JB	790		FQ	1300	
290	YC	800		MD	1310	
300	KQ	810		ED	1320	
310	JI	820		GB	1330	
320	IX	830		IU	1340	
330	PG	840		XZ	1350	
340	PX	850		CF	1360	
350	YC	860		LX	1370	
360	BC	870		NP	1380	
	200 210 220 230 240 250 260 270 280 290 310 320 340 350	200 BA 210 WU 220 KS 230 RF 240 BH 250 OX 260 IJ 270 OQ 280 JB 290 YC 300 KQ 310 JI 320 IX 330 PG 340 PX 350 YC	200 BA 710 210 WU 720 220 KS 730 230 RF 740 240 BH 750 250 OX 760 260 IJ 770 270 OQ 780 280 JB 790 290 YC 800 300 KQ 810 310 JI 820 320 IX 830 330 PG 840 340 PX 850 350 YC 860	200 BA 710 210 WU 720 220 KS 730 230 RF 740 240 BH 750 250 OX 760 260 IJ 770 270 OQ 780 280 JB 790 290 YC 800 300 KQ 810 310 JI 820 320 IX 830 330 PG 840 340 PX 850 350 YC 860	200 BA 710 AR 210 WU 720 KB 220 KS 730 YQ 230 RF 740 ST 240 BH 750 SA 250 DX 760 GC 260 IJ 770 RM 270 DQ 780 DW 280 JB 790 FQ 290 YC 800 MD 300 KQ 810 ED 310 JI 820 GB 320 IX 830 IV 330 PG 840 XZ 340 PX 850 CF 350 YC 860 LX	200 BA 710 AR 1220 210 WU 720 KB 1230 220 KS 730 YQ 1240 230 RF 740 ST 1250 240 BK 750 SA 1260 250 OX 760 GC 1270 260 IJ 770 RM 1280 270 OQ 780 DW 1290 280 JB 790 FQ 1300 290 YC 800 MD 1310 300 KQ 810 ED 1320 310 JI 820 GB 1330 320 IX 830 IV 1340 330 PG 840 XZ 1350 340 PX 850 CF 1360 350 YC 860 LX 1370

IU	370	PZ	880	WP	1390
TA	380	YP	890	TH	1400
DN	390	GF	900	ZZ	1410
MD	400	GW	910	IU	1420
UK	410	VB	920	VJ	1430
BA	420	RK	930	HD	1440
KQ	430	SB	940	EC	1450
TA	440	GV	950	AH	1460
OF	450	CY	960	OY	1470
DV	460	UJ	970	AU	1480
UJ	470	ŲJ	980	PU	1490
GB	480	ME	990	GJ	1500
XR	490	UI	1000	MG	1510
PH	500	DY	1010	OJ	1520
UN	510	YH	1020	GV	1530

Total checksum = 9022602

TYPER

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```
* HIRES TYPER
10
    REM
20
    RFM
         * BY MICHAEL J. BIANCAL
    ANA
    REM * (C) 1986 ANTIC PUBLIS
30
    HING, INC.
         * II COMPUTING VOL.1 N
40
    REM
    0.5
50
    ONERR GOTO 8000
60
    GOSUB 9000
    GOSUB 8000
70
    POKE - 16304,0: POKE
99
                            - 163
    02,0: POKE - 16297,0: POKE
      - 16300,0
100
     XDRAW 11 AT X, Y:K = PEEK (
      - 16384): XDRAW 11 AT X,Y
     IF K < 128 THEN 100
     IF K > 159 THEN 170
120
    IF K > 127 AND K < 159 THEN
130
    260
140 \times = \times + ((SPC * (K = 149)) -
    (SPC * (K = 136))): Y = Y + (
    (SPC * (K = 138)) - (SPC * (
    K = 139)))
150
     POKE - 16368,0
160
     GOTO 200
170
     DRAW K - 159 AT X,Y
     POKE - 16368,0
180
     IF X + SPC < 279 THEN X = X
190
     + SPC
    IF X + SPC > 279 THEN X = 0
200
    : Y = Y + SPC
    IF Y > 191 THEN Y = \emptyset
210
     IF X < \emptyset THEN X = 272:Y = Y
220
     - SPC
     IF Y < \emptyset THEN Y = 191
230
     IF Y < Ø THEN Y = 191
240
250
     GOTO 100
260
     IF K < > 141 THEN 290
270 X = 0:Y = Y + SPC
```

```
280
     GOTO 900
     IF K < > 130 THEN 320
290
     POKE - 16301,0: HOME : UTAB
300
    23: POKE - 16368, Ø: PRINT
    WHAT COLOR? "; : GET CS:C = VAL
    (C$): HCOLOR= C: PRINT C: POKE
     - 16368.0: GET AS: POKE
    16302,0
310
    GOTO 900
     IF K < > 146 THEN 420
32Ø
370
     POKE - 16301,0: HOME : UTAB
    22: POKE - 16368,0: PRINT "
    USE ARROWS TO INC/DEC ROTATI
    ON ": VTAB 23: PRINT "ROT= "
    ; RT
        PEEK ( - 16384)
340 K =
     IF K < 128 THEN 340
350
          - 16368,0: IF K = 141
360
     POKE
     THEN HOME : POKE - 16302,
    0: GOTO 900
370 RT = RT + ((8 * (K = 149)) -
    (8 * (K = 136))) + ((8 * (K =
    138)) - (8 * (K = 139)))
     IF RT < Ø THEN RT = 64
380
     IF RT > 64 THEN RT - Ø
390
     VIAB 23: PRINT "ROT=
400
     VIAB 23: HTAB 6: PRINT RT: ROT-
    RT
410
     GOTO 340
     IF K < > 145 THEN 500
420
430
     HOME : POKE - 16303,0: GOTO
    8000
     IF K < > 137 THEN 900
500
          - 16301,0: HOME : UTAB
510
     POKE
    22: POKE - 16368, Ø: PRINT "
    ARROWS INC/DEC SPACES BETWEE
    N CHARACTERS": UTAB 23: PRINT
    "SPC= ";SPC
520 K = PEEK ( - 16384)
```

continued on next page

```
IF K < 128 THEN 520
530
    POKE
          -16368.0: IF K = 141
     THEN HOME : POKE - 16302,
    0: GOTO 900
550 \text{ SPC} = \text{SPC} + (K = 149) - (K = 149)
    136) + (K = 138) - (K = 139)
     IF SPC < 1 THEN SPC = 18
560
     IF SPC > 18 THEN SPC = 1
570
     UTAB 23: PRINT "SPC=
     VTAB 23: HTAB 6: PRINT SPC
590
    GOTO 520
     GOTO 140
900
    REM LOAD SCREEN
999
1000
     HOME : INPUT "ENTER FILENA
   ME ";F$
     IF FS = "" THEN RETURN
1010
1020 PRINT CHR$ (4); "BLOAD "F$
    ",S"S",D"D",A$2000"
1040 RETURN
     HOME : INPUT "ENTER FILENA
    ME "; F$
2010 IF FS = "" THEN RETURN
2020 PRINT CHR$ (4); "BSAVE "F$
     ,S"S",D"D",A$2000,L$1FFB"
     RETURN
2030
     HOME : PRINT " CLEARING SC
    REEN TO CURRENT COLOR": HGR
: HPLOT 1,1: CALL - 3082
4010 PRINT : PRINT "DONE! ANY K
    EY TO CONTINUE: ": GET KS: RETURN
     HOME : INPUT "ENTER FILENA
5000
    ME ":F$
5010 IF FS = "" THEN RETURN
5020 PRINT CHR$ (4); "BLOAD "F$
     ',S"S",D"D",A$6100"
      POKE 232,0: POKE 233,97
5030
5040
     RETURN
      HOME : PRINT DS: "CAT, D"D",
5000
    S"S
6010 PRINT "ANY KEY TO RETURN T
    O MAIN MENU ";: GET K$
6020 RETURN
6500
     HOME
6510
     PRINT "DATA DISK MOUNTED I
    N SLOT "S" DRIVE "D: PRINT
     INPUT "NEW SLOT# ";S
6520
6530
     PRINT : INPUT "NEW DRIVE "
    ; D
     IF S < 1 OR S > 7 OR D < 1
     OR D > 2 THEN PRINT "INVAL
    ID SLOT AND/OR DRIVE": FOR I
     - 1 TO 1000: NEXT I: GOTO 6
    500
6550 RETURN
     HOME : PRINT "DO YOU WISH
7000
    TO QUIT? (Y/N) ";: GET KS: IF
    KS = "N" THEN RETURN
7010 TEXT : HOME : PRINT "]BYE.
    ": END
B000 POKE
           - 16368,0: TEXT : HOME
    : UTAB 3: HTAB 14: PRINT "MA
    IN MENU": VTAB 6: HTAB 10: PRINT
    "<1> LOAD SCREEN": UTAB B: HTAB
    10: PRINT "<2> SAUE SCREEN":
     UTAB 10: HTAB 10: PRINT "<3
    > EDIT SCREEN"
```

8010 VTAB 12: HTAB 10: PRINT "< 4> CLEAR SCREEN": UTAB 14: HTAB 10: PRINT "<5> LOAD FONT": UTAB 16: HTAB 10: PRINT "<6> CATA LOG": UTAB 18: HTAB 10: PRINT "<7> SET DRIVE": UTAB 20: HTAB 10: PRINT "<8> QUIT" VTAB 23: HTAB 12: PRINT "P ICK ONE: "; : GET KS: POKE 16368,0:A - VAL (K\$) ON A GOSUB 1000,2000,99,40 00,5000,6000,6500,7000 8040 GOTO 8000 9000 D\$ = CHR\$ (4):RT = 0:C = 3 :SC = 1: ROT= RT: HCOLOR= C: SCALE = SC:S = 6:D = 1:T = 256:SPC = 1 9003 ST = 24832: POKE ST, 100: POKE ST + 1,0: FOR I = 1 TO 101:U = 202 + (I * 2): POKE ST + (I * 2), V - INT (V / T) * T: POKE ST + (I * 2) + 1, INT (U / T): NEXT I 9005 FOR I = 25036 TO 25236 STEP 2: POKE I,5: POKE I + 1,0: NEXT I: POKE 232,0: POKE 233,97

TYPO TABLE II

9010 RETURN

Code	Line#	Code	Line#	Code	Line#
XFAPLRIGOBOOZTBJDBUTUWXXHWIXARX	10 20 30 40 50 79 110 110 110 110 110 110 110 110 110 11	O T G P G D L Y K X K I P J G P G K G D L X X I C B C K C C X C K C C X C K C C X C K C C X C K C C X C K C C X C K C C X C X	320 330 350 350 360 370 410 420 420 420 420 510 520 550 550 570 590 999 1000 1020 1020 2010	X G I F G X H F G U C G F B X K O G M D E U K N H U W N G O Y U J U K N H U W N G	2020 2030 4010 50010 50010 50010 6010 6010 6010 601

Total checksum = 4394278

HEX ENTRY

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```
* HEX CODE LOADER AND C
    REM
    HECKSUM PROGRAM
         * BY FRANK HAYES
20
    REM
    REM * (C) 1986 ANTIC PUBLIS
    HING, INC.
        * II COMPUTING VOL.1 N
40
    REM
    0.5
    PRINT "LOADING ADDRESS IN H
    EX (OR Ø TO QUIT) ?
     INPUT AS: IF AS = "" THEN 1
102
    02
110
     GOSUB 1000
    IF B = - 1 THEN PRINT : GOTO
112
    100
    IF B > 65535 THEN
                        PRINT "U
    ALUE TOO LARGE": PRINT : GOTO
     IF B = 0 THEN END
116
120 AD = B
130 CH = 0
    FOR C = 0 TO 31
140
     PRINT C + 1;"
142
     IF C < 9 THEN PRINT " ";
144
146
     INPUT AS
150
     GOSUB 1000
    IF B = - 1 THEN PRINT : GOTO
152
    142
154
    IF B > 255 THEN PRINT "UAL
    UE TOO LARGE": PRINT : GOTO
    142
156 POKE AD + C,B
158 \text{ CH} = \text{CH} + \text{B}
160
     NEXT C
    PRINT : PRINT "CHECKSUM = "
170
    ; CH
172
     PRINT "IF CHECKSUM DOESN'T
    MATCH,"
           33
     PRINT
              RETYPE THIS ROW."
176
     PRINT
180
     GOTO 100
```

```
999 END
1000 B - 0
     FOR A = 1 TO LEN (A$)
1012 B$ = MID$ (A$,A,1)
     IF B$ < "0" OR B$ > "F" THEN
    GOTO 1018
     IF B$ < ":" OR B$ > "@" THEN
1016
     GOTO 1020
    PRINT "BAD HEX VALUE": B =
     - 1: RETURN
1020 B1 -
          ASC (B$) - 48: IF B1 >
   9 THEN B1 - B1 - 7
1022 B = 16 * B + B1
1024
     NEXT A
1026
     RETURN
```

TYPO TABLE II

Code	Line#	Code	Line#	Code	Line#
XR	10	LB	142	хн	180
LC	20	WU	144	EY	999
UP	30	OG	146	YC	1000
PZ	40	GS	150	IA	1010
PT	100	AJ	152	ΙI	1012
OL	102	AR	154	RY	1014
GS	110	NO	156	LU	1016
XT	112	QF	158	PP	1018
FA	114	KE	160	TE	1020
GJ	116	UF	170	VS	1022
PX	120	PQ	172	KA	1024
NN	130	MG	174	GV	1026
ZP	140	HE	176		

Total checksum = 511412

II PAC

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Enter using HEX.ENTRY E6 04 DO 02 E6 05 60 A9 00 85 FF AA A8 9D 00 1C CA DO FA CA 86 02 B1 06 AA BD 00 1C 30 03 FE 00 1C 2O 3O 1F 18 9O EF 2O 87 1D E6 FF A2 0O BD 0O 1C FO 0B E8 DO F8 DE 0O 1C CA DO FA FO EC 96 F9 1DA0: 1DCO: A9 FF 9D 00 1C C8 CO 02 DO E9 A2 O5 B5 F9 9D OO 60 CA 10 F8 60 86 01 A2 06 B5 04 95 18 CA 10 F9 A6 01 60 86 01 A2 06 B5 18 95 04 CA 10 F9 A6 01 60 20 7A 1F 20 A7 1D 20 7A 1F 18 90 08 A5 10 20 7A 1D 20 30 1F 20 D5 1D A0 00 A2 00 B1 06 95 10 20 7A 1D 20 30 1F E8 E0 04 D0 F1 20 E3 1D A5 10 1E00: C5 F9 F0 OC C5 FA F0 08 C5 11 D0 26 C5 12 D0 CF AA A5 F9 20 7A 1D 8A 20 7A 1D E6 02 A2 00 A5 10 1E20: D1 06 D0 08 20 30 1F E8 E0 FF D0 F2 8A 20 7A 1D D0 B3 C5 12 D0 A9 A5 11 C5 13 D0 A1 A5 FA 20 7A 1D A5 10 20 7A 1D A5 11 20 7A 1D A2 00 E6 02 20 D5 1D A5 10 D1 06 D0 13 20 30 1F A5 11 D1 06 D0 CH: 2765 OA 20 30 IF E8 E0 FF D0 E6 F0 C1 20 E3 1D D0 BC F0 O7 E6 O1 A5 O1 20 7A 1D A5 O4 8D OE 60 A5 O5 CH: 3804 1E80:

continued on next page

```
29 1F 8D 0F 60 60 A0 40 84 3D A0 5F 84 3F A0 20 D0 0A A0 20 84 3D A0 3F 84 3F A0 40 84 43 A0 FF CH: 3338
1EA0:
1ECO:
      84 3E C8 84 3C 84 42 20 2C FE 60 20 7A 1F AO FF 84 02 C8 18 A5 07 69 E0 85 05 A5 06 85 04 B1 04
1EE0:
      49 00 91 06 20 30 1F 18 90 E9 A5 1C 29 07 AA BD F8 1E 85 1C 20 F6 F3 60 00 2A 55 7F 80 AA D5 FF
1F00-
      00 80 00 80 00 80 00 80 28 A8 28 A8 28 A8 28 A8 50 D0 50 D0 50 D0 50 D0 00 00 00 00 00 00 00 00
      40 40 41 41 42 42 43 43 40 40 41 41 42 42 43 43 40 40 41 41 42 42 43 43 40 00 00 00 00 00 00 00 00
1F18:
                                                                                                 CH: 1572
1F30:
      85 08 E6 0A A6 0A E4 FE F0 10 BD 00 1F 18 65 09 85 06 BD 18 1F 85 07 A6 01 60 A5 FD 85 0A E6 09
1F40:
      A5 09 C5 FC 90 DE A5 02 30 03 20 90 1E 68 68 60 A2 05 BD 00 60 95 F9 CA 10 F8 A9 10 85 04 A9 60
1F60:
      85 05 A6 FD 86 0A A5 FB 85 09 A9 07 85 08 D0 BA 20 70 1F A9 FF 85 02 A0 00 B1 04 C5 F9 D0 22 C8
1F80:
      B1 04 85 10 C8 B1 04 AA AO 00 A5 10 91 06 20 30 1F CA D0 F6 A9 03 18 65 04 85 04 90 DA E6 05 D0
1FAO:
IFCO:
      D6 C5 FA FO OD 91 O6 20 30 1F E6 O4 D0 C9 E6 O5 D0 C5 C8 B1 O4 85 10 C8 B1 O4 85 11 C8 B1 O4 AA CH: 4071
1FEO:
      AO OO A5 10 91 06 20 30 1F A5 11 91 06 20 30 1F CA DO EF A9 04 DO BF OO OO OO OO OO OO OO OO CH: 2268
```

To unpack pictures into hi-res graphics screen 1:

20 20 21 21 22 22 23 23 20 20 21 21 22 22 23 23 20 20 21 21 22 22 23 23 66 08 30 08 18 A5 07 69 CH: 1367

GRAFIX

Article on page 69

- 10 REM * GRAFIX * BY JEFF HURLBURT * (C) 1986 ANTIC PUBLIS HING, INC. 40 * II COMPUTING VOL.1 N REM 0.2 50 : 100 TEXT : PRINT CHR\$ (17): HOME : PRINT CHR\$ (4)"BLOAD II.P AC, S6, D1" 105 ONERR GOTO 200 READ A, B, C, D, PK, M2, M4, TR, IB 110 ,FL,SU,UP,P1,QD,L\$ 115 GOTO 210 120 REM <SUBROUTINES> PRINT "? Y/N ";: GET Q5:F = 125 ASC (Q\$): IF F < > 4 THEN PRINT "("Q\$")": IF F = 47 THEN POP : GOTO 300 130 RETURN INPUT " >>> ":Q\$: IF Q\$ = " 135 " OR Q\$ = "/" THEN POP : GOTO 300
- 140 RETURN
- 145 POKE C, YS: POKE D, YE: RETURN
- 150 POKE A, XS: POKE B, XE: RETURN
- 155 POKE A, XS - 1: POKE B, XS: CALL TR: RETURN
- POKE A, XE: POKE B, XE + 1: CALL 160 TR: RETURN
- POKE C, YS 1: POKE D, YS: CALL TR: RETURN
- 170 POKE C, YE: POKE D, YE + 1: CALL TR: RETURN
- WAIT 49152,128:TT PEEK (49168): RETURN
- 180 L = PEEK (P1) + PEEK (P1 + 1) * 256: PRINT L\$" PIC LEN= ";L" BYTES.";: CALL - 958: RETURN

- 185 ZZ = PEEK (49232) + PEEK (49239) + PEEK (49237) + PEEK (49234): RETURN
- 190 22 = PEEK (49233) + PEEK (49236): RETURN
- PRINT "PRESS A KEY": GOSUB 195 175: RETURN
- 200 GOSUB 190: FLASH : FOR I = 1 TO 15: PRINT : NEXT I: PRINT " >> ERROR << ": PRINT CHR\$ (7): NORMAL : GOSUB 195: GOTO 300
- 205 REM <MAIN LINE>
- TEXT : HOME : INVERSE : UTAB 2: HTAB 1: PRINT " G R A F I I / O ";: NORMAL : PRINT "": PRINT : PRINT "SOURCE IS DRIVE ";QD;" (/= CANCEL A CMD.)": UTAB 6: HTAB 1: CALL - 958
- NORMAL : PRINT "S = SAVE": 215 PRINT "L = LOAD": PRINT "L LOAD PACKED": PRINT "SP= SAVE PACKED": PRINT "D = DISPLAY PICTURE": PRINT "CS= CLEAR SCREEN": PRINT "C = CATALOG": PRINT "R = E A FILE"
- PRINT "XX= 220 DELETE A FILE": PRINT "P = PRINTOUT CATALO G": PRINT "CD= CHANGE SOURC E DRIVE": PRINT "E = EXIT"
- PRINT : INPUT "SELECT >> ": 225 FS: PRINT : IF FS = "E" THEN END
- IF FS = "CD" THEN QD = QD +230 (QD = 1) - (QD = 2): GOTO 30
- IF FS = "D" THEN GOSUB 185 235 : GOSUB 175: GOTO 300
- 240 IF FS = "CS" THEN PRINT : PRINT "COLOR #";: GOSUB 135:Q% = ABS

(VAL	(09	3)):	IF	0%	<	8	THE	N.
HGR2	: F	POKE	28,	0%:		AL	LF	L:
GOTO	300							
IF F9	5 ==	"YY"	Th	IFN	P	PI	NT	חיי

245 ELETE":: GOSUB 135: PRINT CHR\$ (4) "DELETE"; QS; ", D"; QD: GOTO ROPE

IF F\$ = "SP" THEN 310 250

IF F\$ = "P" THEN PRINT 255 CHR\$ (4)"PR#1":F\$ = "C"

IF FS = "C" THEN HOME : PRINT CHR\$ (4) "CATALOG, D"; QD: PRINT : PRINT CHR\$ (4)"PR#0": GOSUB 195: GOTO 300

IF F\$ = "S" THEN PRINT "SA VE":: GOSUB 135: PRINT CHR\$ (4) "BSAVE"Q\$", A\$4000, L\$1FF8, D":QD: GOTO 300

IF FS - "L" THEN PRINT "LO AD";: GOSUB 135: PRINT CHR\$ (4) "BLOAD"Q\$", A\$4000, D"; QD: L \$ - Q\$: GOTO 300

IF F\$ < > "LP" THEN 290 275

PRINT "LOAD (PACKED)";: GOSUB 135: GOSUB 185: PRINT CHR\$ (4) "BLOAD"Q\$", A\$6000, D"; QD: CALL PEEK (A) > = PEEK SU: IF (B) DR PEEK (C) > - PEEK PEEK (B) > 40 OR PEEK (D) DR (D) > 24 THEN PRINT : PRINT "NOT PACKED!": 22 = 1 / 0

285 L\$ = Q\$: CALL UP: GOSUB 180: PRINT : GOSUB 175: GOSUB 19 Ø: GOSUB 195: GOTO 300

IF FS = "R" THEN PRINT "OL D NAME";: GOSUB 135:A\$ = Q\$: PRINT "NEW NAME";: GOSUB 13 5: PRINT CHR\$ (4) "RENAME"A\$ ',"Q\$",D";QD: GOTO 300 PRINT CHR\$ (7)

295

IF R THEN R = 0: CALL M4: GOSUB 300 190

GOTO 210

310 XS - 0:YS - 0:XE - 40:YE - 2 4: HOME : CALL M2:R = 1: POKE 32,15

UTAB 5: PRINT : PRINT "TRIM ": PRINT : PRINT " W": PRINT "A S": PRINT " Z": POKE 32.7 : PRINT

PRINT "CTRL-W, A, S, Z= UNTRIM ": POKE 32,11: PRINT : PRINT "RETURN= DONE": PRINT : PRINT "/= CANCEL": PRINT : PRINT " TRIM":: GOSUB 125: POKE 32,0 : IF Q\$ < > "Y" THEN 395

325 GOSUB 185

GOSUB 125: IF F = 13 THEN 3 330 95

POKE IB, 255: IF XS + 2 > XE 335

THEN 350

GOSUB 145: IF F = 65 THEN X S = XS + 1: GOSUB 155

IF F = 83 THEN XE = XE - 1: 345 GOSUB 160

350 IF YS + 2 > YE THEN 365 GOSUB 150: IF F = 87 THEN Y S = YS + 1: GOSUB 165

360 IF F = 90 THEN YE = YE - 1: GOSUB 170

POKE IB, Ø 365

GOSUB 145: IF F = 1 AND XS > 370 Ø THEN GOSUB 155:XS = XS -

IF F - 19 AND XE < 40 THEN 375 GOSUB 160: XE - XE + 1

GOSUB 150: IF F = 23 AND YS 380 > 0 THEN GOSUB 165:YS = YS

IF F = 26 AND YE < 24 THEN 385 GOSUB 170: YE - YE + 1

390 GOTO 330

395 HOME : UTAB 10: PRINT "XS, X E, YS, YE: "; XS", "XE", "YS", "YE : POKE A, XS: POKE B, XE: POKE C, YS: POKE D, YE: CALL PK: PRINT : GOSUB 180: GOSUB 190

IF R THEN PRINT : PRINT "O K";: GOSUB 125: IF Q\$ - "N" THEN 325

405 PRINT : PRINT "SAVE AS "LS; : GOSUB 125: IF Q\$ - "Y" THEN

PRINT : PRINT "NAME" ; : GOSUB 410 135:L\$ - Q\$

PRINT : PRINT "SAUING "LS: PRINT "LEN= "L: PRINT CHR\$ (4)"BS AVE"L\$", A\$6000, L\$ 80, D"QD: PRINT CHR\$ (4)"DELETE"L\$:: PRINT CHR\$ (4) "BSAVE"L\$", A\$6000, L ";L: GOTO 300

420 DATA 251,252,253,254,7665,7 846,7858,7883,7905,7914,8048 ,8080,24590,1,"NULL"

TYPO TABLE II

Code Line# Code Line# TU 10 TQ 195 JK 310 JH 20 DF 200 RG 315 UP 30 ZM 205 RG 320 MT 40 XX 210 ZE 325 CG 50 OW 215 UM 330 LY 100 DW 220 RB 335 PX 105 AP 225 KJ 340 PB 110 FF 230 EK 345 XM 115 SC 235 FF 350 KF 120 NX 240 NB 355 WE 125 UF 245 FH 360 GV 130 CG 250 KJ 365 GC 135 LI 255 LA 370 GV 140 ZI 260						
JH 20 DF 200 RG 315 UP 30 ZM 205 RG 320 MT 40 XX 210 ZE 325 CG 50 CW 215 CW 330 LY 100 DW 220 RB 335 PX 105 AP 225 KJ 340 PB 110 FF 230 EK 345 XM 115 SC 235 FF 350 KF 120 NX 240 NB 355 WE 125 UF 245 FH 360 GV 130 CG 250 KJ 365 GC 135 LI 255 LA 370 GV 140 ZI 260 PW 375 NB 145 NV 265 GW 380 LI 150 XX 270 SS 385 ZC 155 NS 275	Code	Line#	Code	Line#	Code	Line#
	JH CCYX BM KFEV CONBICK ASSIVY	20 30 40 50 100 105 110 115 120 125 130 135 140 145 150 165 170 175 180	DFMX333PFCXFGIIVXXSYGRXH	200 205 210 215 225 235 245 255 265 275 285 295 295 295 295 295 295 295	RGGEMBJKFBHJA335UGOUTL	315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 405 410 415

Total checksum = 5700511

GRAPHICS DEMO

Article on page 16

```
REM * GRAPHICS DEMO
        * BY FRANK HAYES
20
    REM * (C) 1986 ANTIC PUBLIS
    HING, INC.
        * II COMPUTING VOL.1 N
40
    0.5
    TEXT : HOME : POKE 49247, Ø: PRINT
50
     CHR$ (17)
   UTAB 1: HTAB 15: PRINT "GRAP
    HICS DEMO": VTAB 4: HTAB B: PRINT
    "LORES: ": UTAB 6: HTAB 12: PRINT
    "<1> RANDOM DOTS": UTAB 8: HTAB
    12: PRINT "<2> RANDOM BARS"
    UTAB 10: HTAB 8: PRINT "HIRE
    S: ": UTAB 12: HTAB 12: PRINT
    "<3> RANDOM DOTS": UTAB 14: HTAB
    12: PRINT "<4> RANDOM BARS":
     VTAB 16: HTAB 12: PRINT "<5
    > DIAGONAL SCRIBBLER": UTAB
    18: HTAB 12: PRINT "<6> SHAP
    E DEMO": VTAB 20: HTAB 12: PRINT
    "<7> DOUBLE HI-RES SCRIBBLER
   VTAB 22: HTAB 12: PRINT "<8>
     QUIT": UTAB 24: HTAB 8: PRINT
    "SELECT ONE: ";
    GET AS: HOME : UTAB 23: HTAB
    8: PRINT "<ESC> TO RETURN TO
     MAIN MENU"
    ON VAL (A$) GOSUB 100,200,3
    00,400,500,600,700,1000
    GOTO 50
    REM
        * RANDOM DOTS (LO-RES)
100
     GR
     COLOR= INT (16 * RND (1))
110
120 X = INT (40 * RND (1))
130 Y = INT (40 *
                   RND (1))
140 PLOT X.Y
150 K = PEEK ( - 16384): POKE -
    16368,0: IF K > 127 THEN RETURN
160
     GOTO 110
199
     REM * RANDOM BARS (LO-RES)
200
     GR
205 COLOR= INT (16 * RND (1))
          INT (40 *
                      RND (1))
215 X2 =
          INT (40 *
                      RND (1))
          INT (40 *
= EX 055
                      RND (1))
          INT (40 *
                      RND (1))
230 Y2 =
          INT (40 *
                      RND (1))
* 04) TNI = EY 2ES
                      RND (1))
    ULIN X1,X2 AT Y3
HLIN Y1,X2 AT X3
240
245
250 K = PEEK ( - 16384): POKE
     16368,0: IF K > 127 THEN RETURN
255
     GOTO 205
299 REM * RANDOM DOTS (HI-RES)
300
     HGR
```

```
310 HCOLOR= INT (8 * RND (1))
       INT (280 *
                     RND (1))
330 Y = INT (160 *
                     RND (1))
340 HPLOT X,Y
350 K = PEEK ( - 16384): POKE
    16368,0: IF K > 127 THEN
    GOTO 310
360
399
    REM * RANDOM BARS (HI-RES)
400
     HGR
405
    HCOLOR= INT (8 * RND (1))
          INT (280 *
                      RND (1))
410 X1 =
415 X2 =
          INT (280 *
                      RND (1))
420 X3 =
          INT (280 *
                      RND (1))
          INT (160 *
                      RND (1))
          INT (160 *
                      RND (1))
          INT (160 *
435 Y3 =
                      RND (1))
440 HPLOT X1, Y3 TO X2, Y3
445 HPLOT X3, Y1 TO X3, Y2
450 K = PEEK ( - 16384): POKE
    16368, Ø: IF K > 127 THEN RETURN
     GOTO 405
455
    REM * DIAGONAL SCRIBBLER
499
500 HGR
510 X1 =
          INT (280 *
                     RND (1))
520 Y1 =
         INT (160 * RND (1))
530 HCOLOR= INT (8 * RND (1))
         INT (280 * RND (1))
540 X2 =
550 Y2 = INT (160 * RND (1))
560 HPLOT X1, Y1 TO X2, Y2
570 X1 = X2:Y1 = Y2
580 K = PEEK ( - 16384): POKE
    16368,0: IF K > 127 THEN
                              RETURN
590
     GOTO 530
     REM * SHAPES DEMO
599
     DATA 1,0,4,0,37,37,63,54,0
600
605
     FOR A = 0 TO 8
610
     READ B
     POKE 768 + A, B
615
     NEXT A: RESTORE
620
625
     POKE 232,0
630
     POKE 233,3
635
640
     HCOLOR= 3
     ROT= 8 * INT (8 *
645
                        RND (1)
650 SCALE= 1 + INT (9 *
                           RND (
    1))
655 X = 40 + INT (200 *
                          RND (1
    ))
660 Y = 40 + INT (80 *
665 DRAW 1 AT X, Y
670 K = PEEK ( - 16384): IF K <
    128 THEN 670
           - 16368,0: IF K = 155
     POKE
     THEN RETURN
```

680 XDRAW 1 AT X,Y 685 GOTO 640 699 REM * DOUBLE HI-RES SCRIBB LER 700 PRINT CHR\$ (4); "PR#3": PRINT 705 GOSUB 755 710 GOSUB 820 HCOLOR= 7 715 720 X1 = INT (560 * RND (1)) 725 Y1 = INT (192 * RND (1)) 730 X2 = INT (560 * RND (1)) 735 Y2 = INT (192 * RND (1)) GOSUB 910 745 X1 = X2:Y1 = Y2750 GOTO 730 755 REM THIS SETS UP THE DOUB LE HI-RES POKE 49278,0 760 POKE 49235,0 765 POKE 49239,0 770 POKE 49232,0 775 POKE 49164,0 780 POKE 49246,0 785 POKE 49247,0 790 795 POKE 49246,0 800 POKE 49247,0 POKE 49165,0 805 810 POKE 49246,0 815 RETURN 820 REM THIS CLEARS THE SCREE 825 HGR 830 POKE 49235,0 POKE 49237,0 835 840 CALL 62450 POKE 49236,0 845 850 RETURN REM THIS PLOTS THE POINT 855 X,Y IF X > 559 OR Y > 191 THEN RETURN 865 Q1 = X / 7870 QX = INT (Q1) 875 FL = QX / 2 - INT (QX / 2)INT (QX / 2) + (Q1 - Q880 QX -X) INT (QX * 7 + .5) 885 QX -POKE 49237,0: IF FL THEN 49236,0 895 HPLOT QX,Y POKE 49236,0 900 RETURN 905 910 REM THIS DRAWS A LINE FROM X1,Y1 TO X2,Y2 915 DX = X2 - X1:DY = Y2 - Y1 920 R = ABS (DX): IF R < ABS (DY) THEN R = ABS (DY)925 DX = DX / R:DY = DY / R 930 FOR A = Ø TO R 935 X = INT (X1 + A * DX + .5)INT (Y1 + A * DY + .5)940 Y = PEEK (- 16384): IF K > 945 K = 127 THEN POKE - 16368,0: POP : RETURN 950 GOSUB 855 955 NEXT A

960

RETURN

1000 TEXT : HOME : PRINT "JBYE.
..": END

TYPO TABLE II

Code	Line#	Code	Line#	Code	Line#
OLUPJHIF F ASF NGXST NSK NGXT UXXXXXVUYYRFYMMFYXIFYK LL	10000005050509000005050505050000000000505050505000000	KKKUTYYHFKKYLKTAYXEANKHRSSFJRQUHWBCWYSPNYJLLLL	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	YAYBXJU ZA KA	7777777777778888888888888888888899999999

Total checksum = 2794242

JUNE / JULY 1986 53

CRYPT .005

Article on page 72

```
REM * TALES FROM THE CRYPT
   PART 5
20
   REM
         * BY CAXTON FOSTER
   REM * (C) 1986 ANTIC PUBLIS
   HING, INC.
40
   REM
        * II COMPUTING VOL.1 N
   0.5
50 :
100
    DIM L%(500), T(50), S(20), D%(
    26,26),A(20,20),U%(20),V%(20
110
    HOME
    PRINT "ENTER CIPHERTEXT.
120
    ND WITH '/'.
130 N - 0
    GET RS
140
     IF R$ = "/" THEN 210
150
    IF R$ < "A" OR R$ > "Z" THEN
160
    140
170 PRINT RS;
180 N = N + 1
190 L%(N) = ASC (R$) - 64
200 GOTO 140
210 FOR C - 2 TO 20
220 S(C) = 0
230 X = INT (N / C)
240 Y = N - X * C
250 IF Y < > 0 THEN 400
260 FOR K = 1 TO N / C
270 \text{ T(K)} = 0
280 FOR L = K TO N STEP N / C
290 A - L%(L)
300 IF A = 1 OR A = 5 OR A = 9 OR
    A = 15 OR A = 21 OR A = 25 THEN
    T(K) = T(K) + 1
310 NEXT L
320
    NEXT K
330 U = 0:D = 0
    FOR M = 1 TO N / C
350 U = U + I(M) * I(M)
360 D = D + T(M)
370 NEXT M
380 D = D / (N / C)
390 S(C) = V / (N / C) - D * D
    NEXT C
410
    HOME
420
     PRINT "VOWEL DISTRIBUTION
430 PRINT "NO.OF COLS
                          VARIANC
440
     FOR I = 2 TO 20
450
     PRINT I,S(I)
460
     NEXT I
470
     FOR I - 1 TO 26
480
     FOR J = 1 TO 26
490
     READ D%(I,J)
500
     NEXT J
510
     NEXT I
     INPUT "SELECT NUMBER OF COL
520
    UMNS=";C
530 DATA 2,14,42,37,98,22,21,88
     ,19,2,5,47,49,49,14,26,1,65.
    62,62,10,9,42,2,17,2
540 DATA 20,1,1,16,20,2,3,2,7,1
```

```
,1,5,9,8,14,1,1,7,12,9,7,1,1
    ,1,7,1
   DATA 41,1,6,8,60,5,2,3,52,1
    ,1,5,2,37,17,1,1,15,23,11,14
    ,1,1,2,7,1
560 DATA 37,1,1,10,115,2,2,1,28
    ,1,1,27,1,108,19,1,1,19,8,6,
    8,1,1,1,5,1
570
    DATA 1,47,48,64,45,20,31,26
    1,28,4,22,70,64,64,6,37,1,14
    6,74,95,11,65,31,1,12,4
   DATA 10,1,1,10,32,14,3,2,16
    ,1,1,8,2,11,86,1,1,7,13,8,2,
    1,1,1,6,1
590
    DATA 19,1,1,6,18,2,3,1,22,1
    ,1,2,1,83,9,1,1,9,4,3,12,1,1
    1,2,1
    DATA 3,1,46,14,23,5,25,4,2,
    1,2,3,,11,8,7,1,9,40,297,1,1
    ,33,1,7,1
    DATA 29,8,20,53,40,26,17,72
    ,1,1,10,53,28,40,10,12,1,60,
    63,111,8,19,33,2,12,1
    DATA 1,1,1,2,3,1,1,1,1,1,1,
    1,1,2,1,1,1,1,1,1,1,1,1,1,1,1,1,
    DATA 10,1,13,1,5,1,1,1,5,1,
    1,3,1,5,7,1,1,8,5,1,1,1,1,1,1,
   DATA 82,19,12,8,54,7,6,2,37
640
    ,1,2,52,1,9,31,20,1,11,11,14
    ,28,1,2,1,4,1
650 DATA 27,1,1,9,47,4,3,3,28,1
    ,1,5,8,8,48,2,1,18,15,10,10,
    1,1,1,7,1
660
    DATA 156,1,1,8,121,2,6,3,18
    9,1,5,2,1,10,132,1,1,15,10,4
    ,33,1,8,1,3,1
    DATA 1,18,60,30,36,42,17,45
    ,55,46,3,36,30,51,26,28,1,66
    ,57,105,1,5,21,1,23,1
680
     DATA 19,1,1,7,35,4,2,2,7,1,
    1,6,17,6,21,11,1,9,24,6,12,4
    ,1,5,6,1
690
    DATA 1,1,1,1,5,1,1,1,1,1,1,
    1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
700
    DATA 87,9,12,13,175,19,17,8
    ,26,1,1,3,4,5,101,33,1,12,7,
    35,40,1,3,1,4,1
710 DATA 82,3,3,25,134,6,8,5,89
    ,1,5,16,10,48,30,5,1,43,47,3
    8,37,1,4,1,17,1
720 DATA 117,1,31,41,81,36,16,2
    3,89,1,3,16,8,121,49,9,1,48,
    124,50,36,1,3,3,19,1
    DATA 9,17,10,13,8,8,7,7,10,
    5,1,11,10,8,78,8,11,11,25,20
    ,1,1,1,1,1,1
740 DATA 18,1,1,2,24,1,1,1,20,1
    ,1,3,1,4,16,1,1,6,2,1,1,1,1,
    1,1,1
750 DATA 9,1,1,13,39,3,3,4,2,1,
```

```
2,4,2,11,32,1,1,8,21,21,1,1,
    1,1,9,1
760 DATA 2,1,1,1,15,1,1,1,2,1,1
    ,1,1,1,1,1,1,1,1,1,1,1,1,1,1
    DATA 21,12,3,7,17,2,2,4,1,1
    ,1,37,5,10,4,1,1,19,5,18,1,1
    ,1,1,1,1
    DATA 1,1,1,1,1,1,1,5,1,1,
    1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,
790 Z = 676 / 10000
800 FOR I = 0 TO C - 1
810 I1 = I * N / C
820
    FOR J = 0 TO C - 1
830 J1 = J * N / C
    IF J = I THEN 930
840
850 F - 1
    FOR K = 1 TO N / C
860
B70 X = L%(I1 + K)
880 Y = L%(J1 + K)
890 T = D%(Y,X) * Z
900 F = F * T
910 NEXT K
920 A(I + 1, J + 1) = F ^ (C / N)
    NEXT J
930
    NEXT I
940
950 F = 0
960
    FOR I = 1 TO C
    FOR J = 1 TO C
970
    IF A(I,J) > F THEN F = A(I,
980
    J):G - I:H - J
990 NEXT J
1000 NEXT I
1010 FOR I = 1 TO C
1020 \, U_{*}(I) = 0
1030 NEXT I
1040 \ U\%(G) = 1
1050 \, U_{*}(H) = 1
1060 \text{ SS} = \text{CHRS} (64 + 6) + \text{CHRS}
    (64 + H)
1070 R = ASC (RIGHT$ (S$,1)) -
    64
1080 FR = 0
     FOR I = 1 TO C
1090
     IF U%(I) = 1 THEN 1120
      IF A(R, I) > FR THEN FR = A
    (R, I):H = I
1120 NEXT I
1130 L = ASC ( LEFT$ (S$,1)) -
    64
1140 FL = 0
1150
      FOR I = 1 TO C
      IF U%(I) = 1 THEN 1180
1160
1170
      IF A(I,L) > FL THEN FL = A
    (I,L):G = I
1180 NEXT I
1190
     IF FL > FR THEN SS = CHRS
    (G + 64) + S5:U%(G) = 1: GOTO
    1220
1200 \text{ S$} = \text{S$} + \text{CHR$} (64 + H)
1210 U%(H) = 1
1220 L = LEN (S$)
1230
      IF L < C THEN 1070
1240
      FOR I = 1 TO C
1250 \, U_{*}(I) = ASC \, (MID$ (S$, I, 1)
    )) - 64
1260 NEXT I
```

```
1270
     FOR J = 1 TO C
1280 X = (U_{\lambda}(J) - 1) * N / C
1290 \ V%(J) = X
      NEXT J
1300
1310
      HOME
      FOR I = 1 TO C
1320
      PRINT U%(I) SPC( 3 - LEN
1330
    ( STR$ (U%(I))));
1340
     NEXT I
1350
      PRINT : PRINT
1360
     FOR I = 1 TO N / C
      FOR J = 1 TO C
1370
    PRINT CHR$ (L%(U%(J) + I)
1380
     + 64)"
     NEXT J
1390
1400
      PRINT
1410
      NEXT I
      PRINT "TRY ANOTHER NO. OF
1420
    COLUMNS (Y/N)";
      GET R$
1430
      IF R$ = "Y" THEN 520
1440
1450 END
```

TYPO TABLE II

Code	Line#	Code	Line#	Code	Line#
X J U P C I L V W A G A G V X X I M K N G U P R J K K D G H L K G W K F G W O B P Z G L V W A G A G S F W I K K K K Y I R J C G K W U U V Y Z Y W X E V F G W	10 20 30 40 50 110 120 130 140 150 160 170 180 190 220 230 260 270 310 320 330 330 330 400 410 430	G I A I Y F 3 G N S N P N I P X N X Y S N I N X X Y S X D I I Y Y D S I Y X A S I Y D S I Y X A	520 530 550 550 560 661 667 667 667 667 772 777 777 777 777 777	S C S C S C S C S C S C S C S C S C S C	990 1000 1010 1020 1030 1040 1050 1060 1070 1080 11100 11100 11100 11100 1120 1130 1140 1150 1120 1120 1120 1120 1120 1120 112

55

ZW	440	KU	910	TY	1380
OF	450	PJ	920	KS	1390
KQ	460	KS	930	HE	1400
BI	470	KQ	940	KQ	1410
BK	480	YG	950	BH	1420

ZP	490	QS	960	RU	1430
KS	500	QU	970	VO	1440
KQ	510	XΩ	980	EY	1450

Total checksum = 3431985

SCREEN TEST

Article on page 68

```
REM
        * SCREEN TEST
   REM * BY FRANK HAYES & MICH
   AEL J. BIANCALANA
   REM * (C) 1986 ANTIC PUBLIS
30
   HING, INC.
   REM * II COMPUTING VOL.1 N
   0.5
50
   TEXT : HOME : PRINT CHR$ (1
   7): POKE 49247,0: UTAB 2: HTAB
   12: PRINT "SCREEN TEST": UTAB
    6: HTAB 10: PRINT "<1> TEST
   LO-RES": UTAB 8: HTAB 10: PRINT
    "<2> TEST HI-RES"
   UTAB 10: HTAB 10: PRINT "<3>
     TEST DOUBLE HI-RES": VIAB 1
    2: HTAB 10: PRINT "<4> QUIT"
    : UTAB 14: HTAB 12: PRINT "S
    ELECT ONE: ";: GET K$
   ON VAL (K$) GOSUB 100,200,3
    00,600
80
   GOTO 50
   REM * TEST LO-RES
    TEXT : HOME : GR
    FOR A = 0 TO 15
120
    COLOR= A
130
    VLIN 0,39 AT (2 * A)
    ULIN 0,39 AT (2 * A + 1)
140
     NEXT A
150
160
     UTAB 24: PRINT "PRESS A KEY
     TO RETURN TO MENU"
       PEEK ( - 16384): IF K <
    128 THEN 170
     POKE - 16368, Ø: RETURN
180
    REM * TEST HI-RES
199
     TEXT : HOME : HGR
    FOR A = 0 TO 7
    IF A = 3 OR A = 4 THEN
                             NEXT
215 HCOLOR= A
220 A1 - A: IF A1 > 4 THEN A1 -
    A1 - 2
225 FOR B = Ø TO 41
230 HPLOT 42 * A1 + B,0 TO 42 *
    A1 + B, 160
235
    NEXT B
240
    NEXT A
245
    VTAB 22: FOR I = 2 TO 32 STEP
    6: READ DS: HTAB I: PRINT DS
    ; : NEXT I: RESTORE : PRINT
    DATA BLK, GRN, VIO, ORG, BLUE,
250
    WHT
     UTAB 24: PRINT "PRESS A KEY
255
     TO RETURN TO MENU"
```

260 K = PEEK (- 16384): IF K <

```
128 THEN 260
265
     POKE
          - 16368,0: RETURN
         * TEST DOUBLE HI-RES
299
     REM
     REM THIS JUST CLEARS THE S
    CREEN
    PRINT CHR$ (4); "PR#3"
     POKE 49154,0: POKE 49156,0:
     POKE 49153,0: POKE 49239,0:
     POKE 49160,0: POKE 49246,0:
     POKE 49232,0: POKE 49165,0:
     HGR : POKE 49237,0: CALL 62
    450: POKE 49236,0: POKE 4916
    5,0: POKE 49246,0: POKE 4924
    7,0: POKE 49246,0: POKE 4924
    7,0: POKE 49246,0
330
    REM NOW SHOW COLORS
    HCOLOR= 7
340
350 \text{ XB} = 0
360
    FOR X0 = 0 TO 1
370
     FOR X1 = 0 TO 1
     FOR X2 = 0 TO 1
380
390
     FOR X3 = 0 TO 1
     FOR AD = 0 TO 28 STEP 4
    IF X0 THEN X = XB + AD: GOSUB
    520
420
    IF X1 THEN X = XB + AD + 1:
     GOSUB 520
     IF X2 THEN X = XB + AD + 2:
430
     GOSUB 520
440
     IF X3 THEN X = XB + AD + 3:
     GOSUB 520
450
     NEXT AD
460 XB = XB + 32
     NEXT X3,X2,X1,XØ
470
     UTAB 24: PRINT "PRESS A KEY
     TO RETURN TO MENU"
490 K = PEEK ( - 16384): IF K <
    128 THEN 490
500
    POKE - 16368,0: RETURN
510 REM DRAWS VERTICAL LINE
520 XX = INT (X / 7):PG = XX /
    2 - INT (XX / 2)
530 XX = INT (XX / 2) + ((X / 7))
    cxx - c
540 XX =
         INT (XX * 7 + .5)
     POKE 49237,0: IF PG THEN POKE
    49236,0
     HPLOT XX,0 TO XX,159.
560
570
     POKE 49236,0
580
     RETURN
     REM * QUIT
599
     TEXT : HOME : PRINT "JBYE."
    : END
```

TYPO TABLE II

Code	Line#	Code	Line#	Code	Line#
PR XG UP PZ SL CG AQ QF	Line# 10 20 30 40 50 60 70 80 99 110 1120 1130 1140 1150 1180 1199	CO KWSTUCAEBXVGFMMYSCUWWG	Line# 215 220 225 230 235 240 245 255 2665 2699 310 330 3310 3350 350	CODE PETHXNWDCX BUGUXJWNSHU	Line# 400 4100 4100 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500 41500
LZ	200	MJ	370	ŲΠ	599
NE DM	205 210	MM MP	380 390	DM	600

Total checksum = 2149901

Attention: Shuttle Tracker Users

If you've had problems with April/May's "Shuttle Tracker" because you've been unable to get the World. Pic file, send us a self-addressed stamped envelope for a listing of the picture.

II ERR IS HUMAN

TYPOII is your ace-in-the-hole for debugging the type-in programs in the Software Library section of *II Computing*; it appears in each issue with special instructions and also on every Action Disk. However, since the first issue hit the stands in October of 1985 we have received a number of letters and phone calls from readers who can't get TYPOII to work properly.

The most frequently reported problem occurs when readers type in the TYPOII MAKER program and save it to disk under the wrong name. Be sure you save the TYPOII MAKER program under the name **TYPOII.**MAKER. This program creates another file called TYPOII; if you save TYPOII MAKER as TYPOII, the program will crash with a FILE TYPE MISMATCH error.

TYPO II MAKER

```
FOR I = 0 TO 41: READ A: POKE
    768 + I,A: NEXT
70
    PRINT DS; "BSAVE TYPOII.OBJ, A
    768, L42"
    PRINT DS; "OPEN"; FS: PRINT DS
40
    : "WRITE": F$
    PRINT "BLOAD TYPOII.OBJ"
50
    LIST 63000,63150
60
    PRINT "RUN 63000"
70
    PRINT D$; "CLOSE"; F$
80
90
100
    DATA
           160,1,132,30,164,30,1
    66, 30, 24, 177, 25, 240, 28, 101
110 DATA 27,133,27,144,15,24,1
    65, 28, 105, 1, 133, 28, 144, 6
    DATA
           165,29,105,0,133,29,2
    02,208,227,230,30,208,219,96
63000
       REM
            TYPO II
            BY GERRY UILLAREAL
63010
       REM
63020
       REM
            (C) 1985 ANTIC PUBLI
    SHING INC.
63030 REM II COMPUTING
63040 TEXT : HOME : PRINT
                              SPC(
    11); "CODE
                   LINE NO.": POKE
```

CHR\$ (4):F\$ = "TYPOII"

```
34,1
63050 \text{ CH} = 0:\text{C1} = 256:\text{S} =
    (103) +
            PEEK (104) * C1
63060 S1 = S + 3:N = PEEK (S) +
     PEEK (S + 1) * C1
             PEEK (S + 2) + PEEK
63070 LINE =
    (S + 3) * C1
63080 IF LINE = 63000 THEN PRINT
     SPC( 7); "TOTAL CHECKSUM = "
    ; CH: POKE 34, Ø: END
63090 POKE 25,51 -
                      INT (S1 / C
    1) * C1: POKE 26, INT (S1 /
    C1)
63100
       POKE 27,0: POKE 28,0: POKE
    29,0: CALL 768
63110 LV = PEEK (27) +
                          PEEK (2
    8) * C1 + PEEK (29) * C1 ^
    2
63120 CODE = LU - INT (LV / 676
    ) * 676
63130 HCODE =
              INT (CODE / 26):L
    CODE = CODE - (HCODE * 26)
             SPC( 12); CHR$ (HC
63140
      PRINT
    ODE + 65); CHR$ (LCODE + 65)
     SPC( B); LINE
63150 CH = CH + LU + LINE: S = N:
     GOTO 63060
```

JUNE / JULY 1986 57

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CIRCLE 140 ON READERS SERVICE CARD

IMPORTANT NOTICE FOR ACTION DISK BUYERS

Il Computing's ACTION DISK runs under Pro-DOS and boots automatically. All magazine programs appear on the menu. To run programs move the inverse menu bar to highlight the program title and press RETURN. To return to the menu, quit program and type RUN STARTUP.

The disk also contains a program to convert programs to DOS 3.3 if desired. To get this program, "break" the menu by pressing the Control key and C key simultaneously. You will see the BASIC prompt 1 after which type —CONVERT. After this program loads, follow screen instructions. To set the direction of transfer, press R. To start the conversion press T. Be sure your destination disk is formatted for DOS 3.3.

Programming the Highlighted Menu Bar by Garry M. DeLong

Anyone who has used Appleworks is familiar with the highlighted menu bar. As you push an arrow key, an inverse bar moves up or down the menu, highlighting each selection in turn. This little demo will illustrate.

Line 30 sets up the menu choices. Remember to DIMension F\$ if the number of menu choices exceeds 10. Line 40 waits for a keypress. Line 55 moves the menu selection bar. The values of 136 and 139 correspond to the left and up arrows while 149 and 138 match the right and down arrows.

- 10 REM * HIGHLIGHTED MENU BAR
- 15 REM * BY GARRY M. DELONG
- 20 REM * (C) 1986 ANTIC PUBLIS HING, INC.
- 25 HOME : TEXT : NORMAL : SPEED=
- 30 F\$(1) = "FUNCTION 1":F\$(2) =
 "FUNCTION 2":F\$(3) = "FUNCTI
 ON 3":F\$(4) = "FUNCTION 4":V
 = 1: VTAB V: FOR X = 1 TO 4
 : PRINT F\$(X): NEXT X
- 35 VTAB V: INVERSE : PRINT F\$(V
): REM PRINTS INVERSE BAR
- 40 KEY = PEEK (16384): IF KE Y < 128 THEN 40
- 45 POKE 16368,0
- 50 VTAB V: NORMAL : PRINT F\$(V) : REM REDRAWS MENU ITEM AFT ER BAR PASSES
- 55 V = V + (KEY = 149) + (KEY = 138) - (KEY = 136) - (KEY = 139):V = V + 4 * (V = 0) - 4 * (V = 5)
- 60 IF KEY < > 141 THEN 35
- 65 ON V GOSUB 100,200,300,400
- 70 END
- 100 HOME : PRINT F\$(V)" DONE": RETURN
- 200 HOME : PRINT F\$(V)" DONE": RETURN
- 300 HOME : PRINT F\$(V)" DONE": RETURN
- 400 HOME : PRINT F\$(V)" DONE": RETURN

FOR THE FUN OF IT

Traveling Down Life's Highway, Via Computer

by NEIL SHAPIRO

ON THE ROAD AGAIN

There are few things I enjoy more on a lazy Sunday afternoon than a drive in the country: tooling down country lanes, passing serene farmhouses . . . it's relaxing and it gives me an opportunity to use my latest machine gun and flamethrower combination!

Board game afficionados will be excited to hear that Steve Jackson's insanely fun board game Car Wars has come to the Apple as the program **Autoduel** (Origin Systems). The computer version captures the mixture of satire and strategy that made the board game a classic.

When you first boot the disk you create your driver. Don't get too attached to the fellow. The action takes place on "the freeways of the future — where the right of way goes to the biggest guns." Your first few sorties in Autoduel will give you a new understanding of the quaint phrase "crash and burn."

Once the character is created, you find yourself in town with \$2000 to spend. But, as a visit to The Assembly Line building quickly shows, two grand won't buy you a car that will keep your body and soul in one piece for too long.

First stop will be The Truck Stop to pick up some body armor, and then you will want to hit The Arena to see if you can't snag some prize money on amateur night. On your trip there you'll be loaned a sort of bargain basement vehicle, a deadly go-cart of destruction. Thankfully, your first opponents will have basically the same weaponry. If you are both lucky and skillful you will be able to blow away the Arena opponents and collect the prize money.

With prize money in hand, head for The Assembly Line. There you will be able to have a car

custom-built for you complete with the weapons of your dreams. Many variables interact during car design, from weight allotment of your car to your weapons and your cash, and the entry screen both displays and updates each variable. The computer calculates it all. The auto designer need only watch the screen.

Your first few sorties give you a new understanding of the phrase ''crash and burn.''

The only real problem with Autoduel is its dull graphics. I would have liked cars that look more menacing—lean, mean muscle machines like those shown on the cardboard counters of the ancestral Car Wars game. Autoduel cries out for a double hi-res version and I hope Origin is planning one.

Meanwhile, if all of the above sounds a trifle bloodthirsty, keep in mind that the game works on many levels, including a satirical one.

HAPPY TRAILS TO YOU

Have you ever wondered how you would have done as a sheriff in the Old West? The new **Law of the West** from Accolade is a spellbinding tour de force of programming that brings new meaning to the term "artificial intelligence." Lest you think that Law of the West is just another shoot'em-up game, let me say at the outset that programmer Alan Miller has done a superb job of making a game in which conversations with your computer seem as realistic as an old movie.

Boot the disk and you're in the middle of a street scene straight from a Hollywood back lot. Some beautiful graphics and animation contribute to the

continued on next page

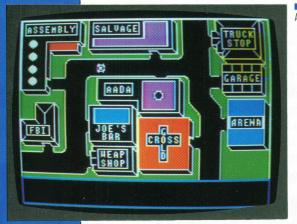


Neil Shapiro is editor-in-chief of MacUser Magazine and is also chief sysop of the MAUG Apple group on CompuServe.

FOR THE FUN OF IT

gameplay as you control the figure of the lawman in the foreground of the screen. With the joystick you choose multiple-choice replies to various conversations and score points by how you interact with the town's residents as each moseys up and chats with you.

As the town sheriff you are graded at sundown (if you survive that long) on how well you maintained your authority, the number of crooks you captured, how well you did romantically, the number of bad guys and innocents folks you shot, and so on.



AUTO DUEL

In each game, you treat the characters individually. People such as the Mexicali Kid will have to be handled quite differently from the demure but extremely attractive schoolmarm. And don't treat the volatile Miss Rose wrong! I am unsure whether or not there is one "best" winning strategy as programmer Miller has designed these "townsfolk" with depth of characterization and motivation.

This brings up the one problem with the game:



LAW OF THE WEST

the documentation gives no indication of what the highest possible score may be. For all I know, I'd be better off if I didn't always insist on getting romantically involved with Miss Rose, but I'm darned if I'll shoot her (although she did once draw on me).

I hope this gaming system will be expanded into a larger "universe"; it's a treat to participate in such realistic computerized conversations.

MANY CHOICES, MANY LIVES

The game **Alter Ego** from Activision is a fascinating way to explore the realm of personal might-have-beens. Six disk sides allow you to generate a new personality and control it from cradle to grave as he or she (Alter Ego is available in both male and female versions) goes through lifetime.

Colorful icons represent social, intellectual, emotional, physical, familial and vocational life experiences from risk taking to keeping up with the Joneses.

Whenever you choose an icon (with joystick or keyboard but not mouse for some inexplicable reason), it expands to fill the whole screen with its particular activity. First you will get a description of an event that your alter ego is participating in. This could be anything from early experiments eating in a high chair to rough professional decisions.

Peter J. Favaro, Ph.D., author of the program, is a clinical psychologist, educator and author. The activity screens are written in engrossing prose that involves the reader with the actions.

For example, when I was at a game age of 19 I was informed that "Your mother calls to to tell you that your father is in very poor spirits lately. He has lost his job."

I had to choose a mood: sad/sympathetic, embarrassed or neutral. I also had to choose whether to talk to him about it or do not mention it to him. I went with sad/sympathetic and ready to talk.

Then I chose what to say from: you feel badly for him and hope he gets a new job very soon, or he should try to find work in a more stable field, or the most important thing in life is that he is a great person and that you love him.

I chose to say that I felt badly and hoped he would get a new job.

Alter Ego said: "He thanks you for your support. Even though you said something positive, I'm sure he would have preferred to hear that he is a worthwhile and cherished human being, too. Getting fired is a truly demoralizing experience. No one can be told they are loved too many times in life. Your family relationships haven't been all that great in the past. Sometimes it takes a tragedy like this to turn things around."

FOR THE FUN OF IT

The one caveat regarding Alter Ego is that it may be unsuitable for younger people. Many of the activities are sexual as are many in real life. The program should definitely be rated "R." The back of the box does carry a warning that Alter Ego contains explicit material which may not be suitable for computer users under the ages of 16. "Parental discretion is advised." Agreed.

PUZZLES WITHIN PUZZLES

Adventure games have always intrigued me. Best of all, in my mind, are those which have a deep and abiding complexity that can be figured out. **Forbidden Castle** from Mindscape is such a game.

Designer Mercer Mayer gives us a game that takes place all in a strange land peopled by ogres and dragons with whom you must converse. The key to this puzzle-solving game is to understand what makes each character tick and to use that knowledge to obtain needed clues.

LAW OF THE WEST



PRODUCT INFORMATION

AUTO DUEL

Distributed by Electronic Arts 2755 Campus Drive San Mateo, CA 94403 (415) 572-2787 64K, \$49.95 CIRCLE 201 ON READER SERVICE CARD

FORBIDDEN CASTLE

Mindscape 3444 Dundee Rd. Northbrook, IL 60062 (312) 480-7667 64K, \$39.95 CIRCLE 204 ON READER SERVICE CARD

LAW OF THE WEST

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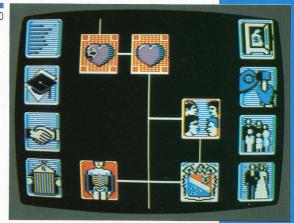
ALTER EGO

Activision
2350 Bayshore Frontage Rd.
Mountain View, CA 94039
(415) 960-0410
128K, \$49.95
CIRCLE 203 ON READER SERVICE CARD

While the Blue Fairy may seem ready to stab you at a moment's notice (as she surely will if you approach her wrong), she is worth getting to know. Only the adventurer who is willing to take risks will succeed here. We recommend that you save the game often and remember—there's a back door to every castle.

Now, if you'll excuse me, Miss Rose did say to pick her up at eight . . . $/\!/$

ALTER EGO



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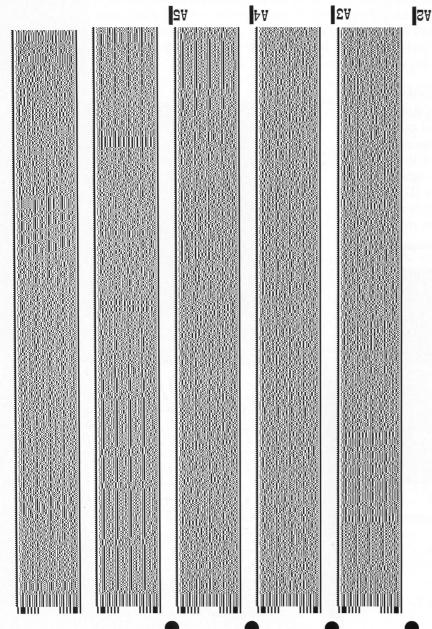
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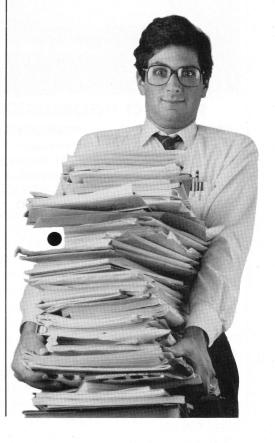


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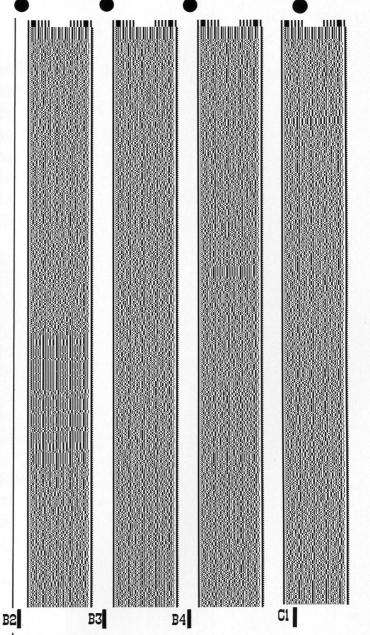
But that's only the beginning of an offer that's going to make you wonder why you haven't stripped yet . . .

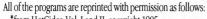


Softstrip COMPUTER READABLE PRINT

The data strips on these six pages feature a directory and six entertaining programs from inCider and Uptime magaines. Our collection includes:

- A STACK ATTACK* it's you versus the machine in this hi-res strategy game
- $B CIDER ZAP^*$ full-featured utility that lets you read raw data and examine it
- C DIRECTORY
- $D-COMETQUIZ^{**}$ a challenging, educational game for astronomy buffs E — COMET HALLEY**
- an eye-catching tutorial about this celestial phenomenon
- F MAILING LIST MANAGER* organize names and addresses as well as print out labels and envelopes
- G DINO MATH* basic math problems for pre-schoolers with colorful graphics and sound effects





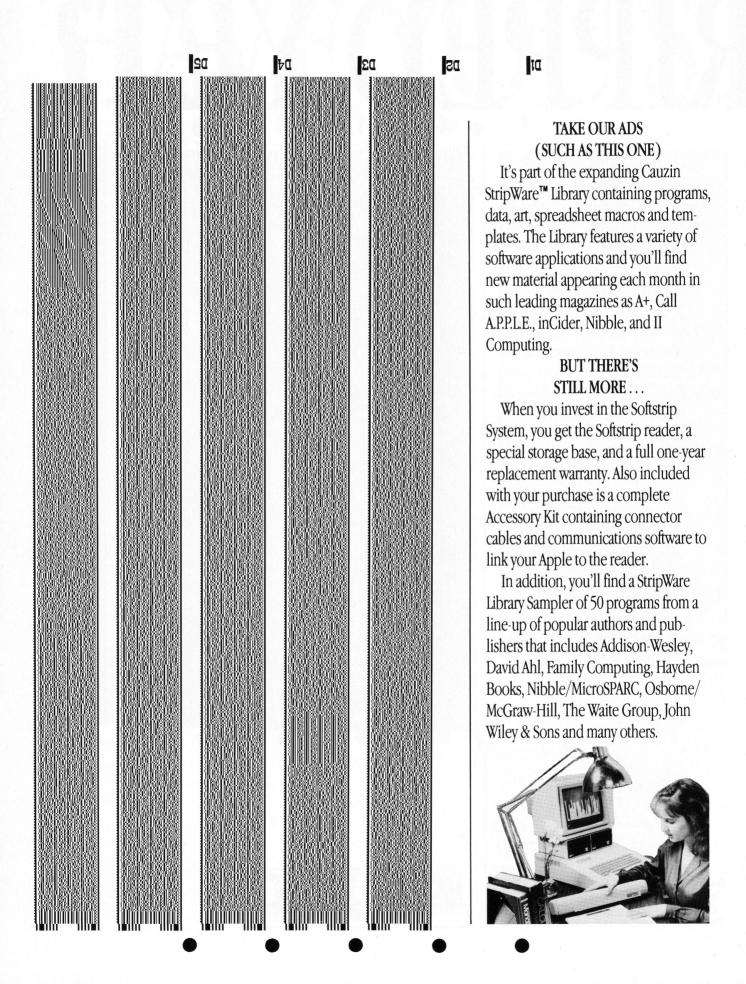
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B1

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E2

E3

E4

E5

FI

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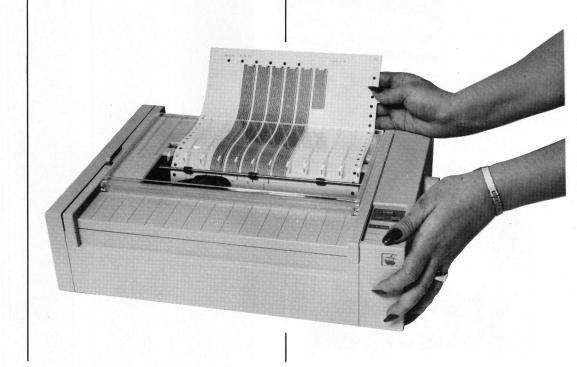
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G2

G1

Screen Test

A Simple Color Test for Your Monitor

by FRANK HAYES, Assistant Editor, and MICHAEL J. BIANCALANA, Technical Assistant











RGB

COLOR COMPOSITE

TV WITH MONITOR INPUT

TV WITH RF MODULATOR

GREEN MONOCHROME

Is your Apple giving you exactly the display you want?

How your screen looks depends on whether you've properly adjusted your color, tint and brightness controls, of course. But just how clear a display you get also depends on whether you're using a TV set or a monitor.

TV OR NOT TV?

Steve Wozniak designed the Apple II to be able to use an ordinary black-and-white or color TV as a display, and many people still use their Apples connected to TVs. The connection is simple: plug an RF modulator into the monitor port on the back of your Apple II, and connect it to the antenna terminals on the back of your TV. Turn on the TV, select the channel and you've got an Apple display.

Why doesn't everyone just use a TV? Mostly because an ordinary TV is limited in the number of dots it can clearly display on the screen. A color TV can only display about 280 dots (or 40 characters) on each line. A black-and-white TV is slightly better, but not enough to put more dots on each line. If you try using, for example, an 80-column text display on a TV, you'll find that what's on the screen becomes smeary and unreadable. That's because you're sending dots out faster than

the TV can handle them.

The solution is a *monitor*. A monitor is like a specially designed TV with no tuner; you can't watch *Gilligan's Island* reruns on an 80-column monitor, but it can display more individual dots on each line of your screen—which translates into more characters per line. In fact, a monochrome monitor can usually display up to 560 dots per line, twice the best resolution a TV can deliver.

Color is another problem. Color screens for your Apple come in three basic varieties: TVs, composite monitors and RGB monitors. A TV has a small bandwidth, as we've seen. A composite monitor is like a souped-up color TV—but because a color video signal is much more complicated than black-and-white, you may get that smeary, unreadable look even from a composite color monitor with a good bandwidth.

An RGB monitor solves that problem by receiving all the color information from your Apple separately. As a result, this kind of monitor can give you very clear, readable text in color. But there's a price for that clarity: an RGB monitor has a *very* high bandwidth, as well as very high dot density on the screen. That means it's much more expensive to manufacture than a composite monitor. In addition, the Apple II isn't built to send an RGB

signal, so running an RGB monitor requires an extra plug-in circuit card to provide the special signal.

ADJUSTING THE COLOR

One of the most common complaints about using an Apple II with a color display is that it's hard to get the color adjusted correctly. On a TV set, if J.R. Ewing's face is green, you know there's something wrong. But it's not always so easy to get the colors on an Apple properly adjusted.

That's where the **SCREEN. TEST** test pattern program in this month's Software Library can come in handy. Type in the program from page 56, or boot it from the Action Disk. The "Test lo-res" option puts the 16 colors available in lo-res graphics on the screen. You can compare them to the illustrations accompanying this article to make sure you have your TV or monitor adjusted the way you want it. If it's not, adjust the color, tint and brightness controls until the screens match.

You can also choose "Test hi-res," which does the same thing for the six hi-res colors, or "Test double hires," which displays the 16 colors of double hi-res graphics. Be careful, though—the double hi-res colors are similar to the lo-res colors, but they're not exactly the same!//

POWER PROGRAMMING

Picture Packing

Compressing hi-res pictures to save disk space

by JEFF HURLBURT

When it comes to doing really spectacular, creative—and marketable—things with your Apple II, the name of the game is high-resolution graphics. With utilities such as KoalaPainter and Blazing Paddles, and increasingly affordable digitizing hardware, it's easy to produce effective, even startling, displays. But efficiently storing and retrieving hi-res graphics is a problem that still stymies many would-be creators.

A hi-res picture takes up 8K of memory, and it's usually stored as a 33-sector file on a disk. That means even a relatively simple program with lots of pictures can run to two or more disk sides, with all the disk-flipping and program complexity that entails. Things would be much simpler if you could pack your pictures into one-third the space or less—or even cut out half-screen or quarter-screen displays and cram them into just a few sectors!

The solution—the way the pros do it—is called *packing*.

THE CHALLENGE: APPLE'S HI-RES DISPLAY

Looking at your Apple's hi-res screen is much like looking directly at a block of memory. The display is bit-mapped—that is, each dot on the screen corresponds to a single bit in memory. If the value of the bit is 1, the dot is lit; a 0 leaves the dot dark.

But it's a little more complicated than just looking at the contents of memory—the Apple II's display memory is organized in an unusual way. For example, type in and run the short program in Figure 1. The program fills the hi-res display memory from beginning to end; the screen, though, fills in a much more complicated way.

Figure 1 10 HGR 20 FOR A=0 TO 8191 30 POKE A+8192, 255 40 NEXT A

To understand why, a little history is in order. Long ago, when Steve Wozniak designed the first Apple IIs, he worked hard to reduce the number of power-hungry ICs populating an ever-more-crowded motherboard. One of Woz's major achievements was using the same circuitry to refresh memory and to put hi-res graphics on a TV screen.

As a result, hi-res graphics information appears in the Apple's memory in a way that's convenient for the circuitry, not the programmer. Of the 8192 bytes in a hi-res graphics area of memory, only 7680 bytes are actually displayed, and they're displayed in unusual order. For example, the top line of dots on the screen comes from locations 8192 to 8231, but the next line comes from 9216 to 9255, and the eighth line starts at 15360—near the end of display memory!

This explains why you can't save the top half of a picture by saving the first half of the memory block in which it is located. You've also probably noticed that when you clear the hi-res screen, it doesn't go blank from top to bottom. Instead, what you get is a kind of venetian blind effect—the result of the unusual way graphics information is stored in memory.

A side effect of this system is that the circuitry skips over eight bytes of each 128—it just ignores them completely. That's why even though a screenful of hi-res graphics only contains 7680 bytes worth of information, it still gobbles up a full 8K of memory.

Jeff Hurlburt is an Apple programmer and graduate student at the University of Houston, with special interest in education for gifted and talented children.

POWER PROGRAMMING

PACKING THE PICTURE

To squeeze a picture into a smaller space, most picture-packing programs scan the picture to look for repeated patterns. Pictures tend to have large areas of one color—green fields, blue skies, etc. If there are 50 dots in a row that are green, it's more compact to say "the next 50 dots are green" than to say "green green green green green" over and over 50 times. That's packing.

Numerically encoding a sequence of repeated dots can be very simple. For example, if the number 1 means "the following dot is repeated" and the code for black is 0, then a totally black screen might be encoded as "1 0 53760" for "repeat a black dot 53,760 times." A more complicated picture would just be a series of similar sequences, with different colors repeated different numbers of times. The block of code thus created is the packed picture.

Computers prefer their information in bytes, not just bits, so most picture packers scan for sequences of repeated bytes rather than repeated bits. And

II.PAC can quickly pack and unpack your hi-res pictures.

because computerized pictures tend to change more from side to side than from top to bottom, the best way to scan a picture for packing is vertically. The Apple's complicated scheme for mapping memory to the display screen makes this more difficult, but it produces a more tightly packed picture.

It turns out that while simple pictures can easily be encoded this way, many Apple hi-res pictures use a special technique called *dithering* to expand the range of colors that can appear on the screen. In dithering, two adjacent rows are of different colors. Most color combinations look pretty ordinary, but some produce remarkable effects: for example, stacking rows of green and purple produces grey on the display screen, and stacking purple and orange creates pink.

When a packing program scans an area of dithered color from top to bottom, it spots alternating bytes. That can't be encoded efficiently with a repeated-byte system—but it can be tightly encoded as repeated byte pairs. Just as we defined a special code for repeated bytes, we can do the same thing for byte pairs. If the number 2 means "the following pair of bytes is repeated," the sequence "2 42 85 90" would mean "repeat 42 and 85 for a total of 90 pairs."

II.PAC FEATURES

II.PAC is a relatively short machine-language program that can quickly pack and unpack your hires pictures. It also lets you pack pictures that are smaller than a full display screen—sections as small as a 40-column text character. And II.PAC doesn't momentarily put garbage on the screen when it changes the picture; instead, the new display simply wipes across the old one.

A packed picture may take as little as one-third or one-fifth of the disk space of the original—as few as 6 to 11 sectors—and simple graphics and part-screen sections often need only two or three sectors. Unpacking a picture takes from a few milliseconds for small patches to just under half a second for full-screen pictures.

The II.PAC program fits into about 650 bytes of memory and uses an extra 256 bytes when it's packing. The unpacker uses less than 250 bytes, and can be split off from the rest of II.PAC for use in larger, memory-hungry applications.

INSIDE II.PAC

II.PAC's PACK and UNPACK routines work pretty straightforwardly. PACK begins by counting the number of times each byte value appears in the picture, and then picks the two with the lowest frequency, which is almost always zero. These two values will serve as the prefixes that indicate single-byte and byte-pair repetition (in the program, they're called PFX1 and PFX2).

Then PACK scans down each vertical column of bytes in the picture, counting and encoding runs of identical bytes and byte-pairs. Bytes that aren't part of a run are simply copied as is. For example, suppose that a picture begins with a run of 15 bytes, each with a value of 170, and that the PFX1 value is 1. The program packs the run into three bytes -1, 170, 15 ("repeat 170 15 times"). If the next set of bytes consists of eight pairs that alternate between 42 and 0, and PFX2 is 14, it packs that run into four bytes (14, 42, 0, 8). Because each number must fit into a single byte, no packed run can be longer than 255 bytes; a longer run is simply broken into smaller pieces. Naturally, any occurrence of a PFX byte in the picture requires strong measures; using the above PFX values, finding a single "1" value results in the code "1, 1, 1" ("repeat 1 once").

PACK takes four numbers as input—XStart, XEnd, YStart and YEnd, which are POKEd into locations 251 through 254. Since 40-column text character-size units are employed, a full-screen pack uses the inputs 0,40,0,24. After POKEing these numbers, you can CALL 7665, which packs the picture in hi-res graphics screen 2, and then BSAVE

POWER PROGRAMMING

the packed picture.

UNPACK has a much easier job; all it has to do is recreate the picture, following the directions created by PACK.

TYPING IN AND USING II.PAC

If you have the *II Computing* Action Disk, you've already got II.PAC. But to type it in by hand, you'll first need to type in the BASIC program **HEX.ENTRY** on page 49 in the Software Library. On the same page you'll find the hexadecimal listing for II.PAC. Run HEX.ENTRY, and for each row in the II.PAC listing, first type in the hexaddress and then the 32 hex bytes of the program. After 32 bytes, HEX.ENTRY will report a checksum, which should match the checksum at the end of the line in the II.PAC listing. If it doesn't, type the line again.

Now save the program with the command

BSAVE II.PAC, A\$1D7A, L\$286

Since you may want the unpacker by itself sometime in the future, now is a good time to save it as a separate file:

BSAVE II.PAC.UNPACKER, A\$1F00, L\$F7

If you want to unpack your pictures in hi-res graphics screen 1 instead of screen 2, you can change the appropriate bytes by typing in the special row at the bottom of the hex listing. Then save it separately under a different file name:

BSAVE II.PAC.UNPK.S.1,A\$1F00,L\$F7

GRAFIX is a short BASIC program that puts all of II.PAC's features at your fingertips—you'll find it on page 50 in the Software Library, or boot it from the Action Disk. With GRAFIX you can load standard (unpacked) pictures as well as packed pictures, and save pictures in either format. Other features include changing or CATALOGing the drive, DELETEing and RENAMEing files, and trimming the size of pictures on your screen.

Few utilities can boost your programming power more than fast, efficient display compression. With II.PAC and GRAFIX, you've got it—picture crunching that can make all kinds of graphics programs faster, tighter, and easier to use.//



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Dealer inquiries invited

Incomplete Columnar Transpositions

by CAXTON C. FOSTER



Caxton C. Foster, a Ph.D. in Electrical Engineering, was a Computer Science professor at the University of Massachusetts. Currently he is a consultant to Mount Castor Industries of East Orleans, MA, which designs computer programs for school administrative use. Dr. Foster is the author of five books and numerous technical articles.

This column is about using your computer to solve ciphered messages. Each installment builds on material previously presented, so first-time readers may not be familiar with the terminology and concepts. If you want the full series of these articles, start with Vol. 1 No.1, of II Computing, or get Dr. Foster's book Cryptanalysis for Microcomputers (Hayden), which parallels much of this material.

In the last "Tales From the Crypt" we looked at complete columnar transpositions. Remember, in a transposition cipher the letters themselves aren't changed, but they've been scrambled—each letter's position in the message has been changed. In a complete columnar, you choose a keyword, then write the message out in rows under the keyword. For example, with the keyword "CROWD," the message

NOW IS THE TIME FOR ALL GOOD MEN TO COME

is written out as

C R O W D N O W I S T H E T I M E F O R A L L G O O D M E N T O C O M E X X X X

Notice that we've added Xs to the end to fill out the columns. Next you look at the letters of the keyword, choose the keyword letter that's earliest in the alphabet, and read that column out, from top to bottom. Then you read off the column headed by the next earliest letter, and so on through all the columns. This scrambles our message to

NTMAO TESIR ONMXW EFLMC XOHEL DOXIT OGEOX

As you saw last time, if you begin by analyzing the possible arrangements of rows and columns, you *can* solve this type of crypt, though it's difficult. It becomes much *more* difficult to solve when you don't add empty spaces to fill out the columns—so of course that's what we want to examine.

Look at our "Now is the time" message again, this time with incomplete columns:

N O W I S T H E T I M E F O R A L L G O O D M E N T O C O M E

There are four columns with six letters and one with seven. Someone with the keyword will be able to construct an outline of the message block, knowing the number of letters in the keyword and in the message. Someone intercepting the message generally won't know the length of the keyword or which was the long column, and so he won't be able to reconstruct the columns—the first step in cracking a complete columnar.

THE OVERLAPPING PROBABLE WORD

In the real world, if you intercepted a ciphertext message you would be likely to have some knowledge about the subject of the message—that it was about drugs or the latest fashion designs or some such thing. To simulate this situation in our crypts, I'll give some hints in the form of "proba-

ble" words that "might" be found in the crypt. (Actually, any author who published a "probable" word that was not in the crypt would be in danger of being lynched.)

Suppose you intercept the message

PCRAY KNOII SAAEV OEELS EEULS NWMMR S

with the probable word SIRENS.

To begin, you need to find the number of letters in the keyword. Suppose that there are three; then SIRENS will wrap around itself in one of the following patterns:

Since you read off a columnar cipher down each column, you can conclude that if the word SIRENS is really present and if the keyword has three letters, you should be able to find the patterns SE, IN and RS somewhere in the ciphertext.

We'll create a contact chart for the letters in the ciphertext. Write down the letters from A to Z, and next to each letter write the letters that follow it in the ciphertext. The first letter in the ciphertext is P, followed by C, so in the contact chart next to the P put a C. C is followed by R in the ciphertext, so next to C inthe contact chart put an R. Continue to the end of the message. The result:

A: YAE B: C: R D: E: VELEU F: G: H: I: IS J: K: N L: SS M: MR N: OW O: IE P: C Q: R: AS S: AEN T: U: L V: O W: M Χ: Y: K Z:

You find SE and RS but no IN—so your guess of three columns is wrong. Trying four columns gives

which means SN and IS should both appear in the contact chart-and they do.

Explore two columns or five columns and you'll have to reject them because of missing combinations. A keyword of six or more letters wouldn't give any overlap, so knowing SIRENS was a probable word wouldn't help. (Besides, that would make it a poor example for a section titled "The Overlapping Probable Word"—sometimes you have to take help wherever you can find it!)

There are 31 letters in the message, and the keyword has four letters. Since 31 divided by 4 is 7 with 3 remaindered, the message will form a block with three columns of eight letters and one column of seven—like this:

When you examine the ciphertext you find only one IS and one SN in the message. Write out the ciphertext from IS to SN:

The question is, are there any arrangements of the letters of SIRENS that could give rise to this spacing? Remember, there are only four ways the word could appear in the block:

Look at arrangement A. You want to fit in the 13 letters between IS and SN. You can use up six letters filling out the bottom of column 2 and the top of column 1 (more in one place and less in the other, depending on how far down the block

continued on next page

the word SIRENS appears). There are seven remaining letters to account for—and since column 4 will always have seven letters in it, you could get the ciphertext with columns taken in the order 2, 4, 1. There may be other ways also, but all we care is that it's possible.

Now look at the ciphertext following SN. There are only five more letters: WMMRS. Since the shortest column has seven letters in it, the last seven or eight letters in the ciphertext must form a complete column—either LSNWMMRS or SNWMMRS. Since SN is near the top of the column, the word SIRENS must be near the top of the crypt block.

Next, look at the beginning of the crypt. The first seven or eight letters must also form a complete column—either PCRAYKN or PCRAYKNO. Since SIRENS must appear near the top of the crypt block, there must be an R near the top of one of the columns. There are only two R's in the crypt, and one comes near the bottom of a column. Thus, the R in PCRAYKN or PCRAYKNO must be the R in SIRENS, and it must appear in row 3 of the crypt block.

Now try the four arrangements A through D, filling in the information you've got. Remember, column 4 must end with a blank space, so you'll fill that space with a "#":

This is enough information to eliminate three of the possible blocks. Arrangements A and B won't work because the last letters of the ciphertext must form the bottom of a seven- or eight-row column. Arrangement D won't work because the last position in column 4 must be blank. Thus, you'll find that only arrangement C will work. Filling in the rest of the letters, you get:

POLI CESI RENS ALWA YSMA KEME NERV OUS and discover that the message is "POLICE SIRENS ALWAYS MAKE ME NERVOUS."

Here's another incomplete columnar:

EOHNT YFLIW RUIBI OOATE ARYAS SNNIS AANCF PIOSW SIUIP RDUTC THYEA OAPKM CWAEL NLEOI NCUMF RRUEI YOLUP EDN

For this one, the probable "word" is CAN BUY A LIFE. Try it, using the techniques you used on the SIRENS message, and then try your hand on these:

- 1. Probable word: MILITARY SPECIFICATIONS
 AEANT IRTHE TPSLF MDCDI LYIAR BEABT CLSMN
 ATPNC SYANU AASGI LOMCE EOAST SOANT
 EUIIO DEHEI IIIME MOES
- 2. Probable word: WIFE IS RIGHT
 TEERG HTREU HCRSE HOOHH TOTEY SRWCS
 NAEIE IEUFE EWOIR UFTYR SWNTI BBUIW
 NUHOT SMCWH EHSRD ENAAI TNEEE ORODO
 REAOT YN
- 3. Probable word: CONSERVATIVE BECAUSE
 SEESE AHATE EEITH RSWHE RAEOO IROCV
 HOWEH LNBYT YOOEC VURTU EDPMT ECEDM
 WPOEE RAMNR OASIH NITBE CRER
- 4. Probable word: VEGETARIANISM AS
 NPTVS HSEEO TNSRR TAOEM ETIHO IAOVH
 TEFSR NEUOO EISOL DSGLI GSNOH OAAAA
 GSEDE ITEYT TGTLL LDLLG AWI

Your challenge this time is to write a program that will build the contact chart, read in the probable word, lay out all possible overlaps from three columns to no overlap, and select possible numbers of columns that have the correct sequences of letters. (I personally would stop at that point and continue by hand, but you may want to see what more can be done.)

Once you have finished the program, use it to decipher the four incomplete columnars above, and send your plaintext to CRYPT, c/o *II Computing*, 524 Second Street, San Francisco, CA 94107. The editors will randomly select one correct entry out of all those received by July 15, and award that reader a free six-issue subscription to *II Computing*'s Action Disk edition.

DISCUSSION OF LAST ISSUE'S CHALLENGE

Your challenge last time was to write a program continued on page 76

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continued from page 74

to analyze a complete columnar transposition cipher. The program had to do all of the following: read in the ciphertext; strip out the blanks; count letters; try all possible arrays and pick the one with the most even distribution of vowels; set up that array; read in the digram frequencies from data statements; try all possible column pairs in both orders; select the best pair; find the best column to precede this partial block and the best to follow it; and continue to arrange columns until the entire cipher is done.

One approach is to write this as a collection of subroutines that you could include in other programs. I wrote mine as a straightforward program, since that's a little easier to explain. Further, I didn't put in any guards or editing features, which will typically add as much as 50 percent to the size of a program. For commercial software, those features are a must, but we're writing these for ourselves.

The program is on page xx in this month's Software Library and on the Action Disk. Here's how it works:

Lines 100-200 let you type in the ciphertext, stripping out anything that's not a letter from A to Z, and storing the resulting characters in array

L%. In the array, A is stored as 1 and Z as 26; the variable N is the number of letters in the ciphertext.

The loop beginning at line 210 tries keywords from 2 to 20 letters long. Lines 220-250 check to see if C is a factor of N. Lines 260-320 count the vowels on each row in array T. Lines 330-400 calculate the variance for each keyword length, and lines 420-460 print out the distributions. Line 520 asks the user to select a keyword length based on the information displayed.

Lines 470-510 read the DATA statements in lines 530-780, which contain the digram frequency information from the table in the last issue.

Line 790 sets up a variable Z, which contains the reciprocal of the average number of occurrences of all digrams. We need this so that the product won't get too big and cause an overflow. Lines 800 and 820 begin the loops to compare every column with every other one. I1 and J1 are the positions of the starting letters in the columns. Lines 850-910 compute the product of the digram frequencies corrected by Z, and 920 takes the N/C-th root of that product.

Lines 950-1000 find the largest geometric average. Lines 1010-1200 select the best pair in the best order, and lines 1210-1260 make sure the process is repeated until all columns have been placed. Finally, lines 1270-1410 print out the message as the program has deciphered it.

The first correct response to the challenge in the February/March issue was submitted by Bryant Farnsworth of Tallmadge, OH. He received a sixissue subscription to *II Computing*'s Action Disk. Right behind Bryant were Brian Hahn of Clinton, WI, and Dr. Jim Akers of Starkville, MS. The encrypted messages were:

- 1. I am different from Washington; I have a higher, grander standard of principle. He could not lie. I can lie, but I won't.
- 2. I have certainly known more men destroyed by the desire to have a wife and child and to keep them in comfort than I have seen destroyed by drink and harlots.
- 3. The tree of liberty must be refreshed from time to time with the blood of patriots and tyrants. (T. Jefferson)
- 4. When the minister asked the aged New Englander, "Have you made your peace with God?" the crusty Yankee replied, "We ain't quarrelled lately."

Several readers have asked about the asterisks that appeared in the substitution ciphers at the beginning of some words. Those asterisks indicate that the word is to be capitalized once it's translated into plaintext.//

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Due to the delicate nature of some Real Life issues, this product is not recommended for children under 13.

Take 1

by CLINT HICKS

TAKE 1
Baudville, Inc.
1001 Medical Park Drive, S.E.
Grand Rapids, MI 49506
(616) 957-3036
Apple IIc, IIe or II +
Two disk drives, color monitor recommended
64K
\$59.95
Supplementary art disks:
Actors and Actions, Heroes and Villains (\$30 each),
Business (\$50)
CIRCLE 220 ON READER SERVICE CARD

You don't have to watch Saturday morning's pitiable offerings to know that conventional animation is well past its heyday. But now, computers are replacing most of the horde of pen-and-ink artists that cartoons once required, and doing increasingly fine (and much less expensive) animation. The introduction to *Amazing Stories* on NBC is a good example.

If you're intrigued by computer animation, the good news is that you can now try it out on your Apple II, using a very credible program from Baudville called **Take 1**. The bad news is that you won't get quite the results that special effects pros get with their monster machines. Nor, I suspect, will you find many serious applications for your work. Nevertheless, I've had fun with this program, and I bet you will, too.

The program itself requires you to take hi-res pictures from other

applications (such as Baudville's own Blazing Paddles and Dazzle Draw from Broderbund). These pictures become both your backgrounds and the objects and characters which you move in front of them ("actors"). There is no facility within the pro-

While perhaps not a serious animation tool, Take 1 lets you create animated art.

gram for creating hi-res graphics, although it does give you the ability to modify individual pixels in ready-drawn pictures. In addition, the company sells a number of disks that contain both backgrounds and actors.



Entirely menu-driven, Take 1's six major sections take you step-by-step through the process of creating a short movie. "Pictures and Backgrounds" allows you to adapt existing pictures into background files, whereas "Actors and Snapshots" lets you change pictures into snapshots that, taken in sequence, will create the movement of a single character.

Next, you compose a scene by selecting a background and the actors that will appear in the scene and then placing them within each frame. You can scroll backward and forward among the frames you've done to see how you're progressing. Simple text and sound effects are available. One or more scenes make up a movie; you can select from a number of possible ways to fade from one scene to another. Finally, the completed movie can be viewed once or repeatedly. (This option might be used for a continuously-running advertisement in a store.) The last menu item features standard disk utilities: format, copy, delete and the

Depending upon the memory configuration of your computer, the program will support about a minute of animation before it has to go to disk to get the next scene(s). Disk space as well is a limiting factor in the length of a potential movie, although I haven't yet run into this limit with my system.

It's a good thing that the documentation is thorough and clearly written, for this program makes you use a large number of different keys to get to its various features. Incredibly, it supports neither mouse nor joystick, and as the arrow keys are reserved for scrolling through its ubiquitous menus, you're back to using the "i," "j," "k" and "m" keys to move objects on the screen. This annoyance, however, is the only serious problem with what is otherwise a nifty little toy.

Clint Hicks, a technical writer with JMM Consulting Engineers in Pasadena, California, reviews computer software, hardware, and books.



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The Printer Connection

II Computing's Printer Interface Survey

by FRANK HAYES, Assistant Editor

Name	Manufacturer's address and phone	Computer	Installation procedures	Serial or parallel	Printers supported
AlphaBits II CIRCLE 208 ON READER SERVICE CARD	Street Electronics Corporation 1140 Mark Avenue Carpinteria, CA 93013 (805) 684-4593	Apple IIe	Set eight DIP switches, intall in slot, mount cables	Serial	Apple, NEC, C.Itoh, IBM, Epson, Okidata
Business Card CIRCLE 209 ON READER SERVICE CARD	Street Electronics Corporation 1140 Mark Avenue Carpinteria, CA 93013 (805) 684-4593	Apple He	Set one jumper and 10 DIP switches, install in slot, mount cables	Either	Apple, NEC, C.Itoh, IBM, Epson, Okidata
Dumpling-GX CIRCLE 210 ON READER SERVICE CARD	Microtek, Inc. 4750 Viewridge Avenue San Diego, CA 92123 (619) 569-0900	Apple II, II+ or IIe	Set eight DIP switches, install in slot	Parallel	Apple, Epson, Anadex, Okidata, C.Itoh, NEC, Centronics; special version for IDS
GraphiCard CIRCLE 211 ON READER SERVICE CARD	Practical Peripherals, Inc. 31245 La Baya Drive Westlake Village, CA 91362 (818) 991-8200	Apple II, II+ or IIe	Set four DIP switches, attach cable, install in slot	Parallel	Apple, Epson, NEC, C.Itoh, Anadex, IDS, Okidata
Grappler + CIRCLE 212 ON READER SERVICE CARD	Orange Micro, Inc. 1400 N. Lakeview Avenue Anaheim, CA 92807 (714) 779-2772	Apple II, II+ or IIe	Set four DIP switches, attach cable, install in slot	Parallel	Apple, Epson, NEC, C.Itoh, Okidata, Star, Anadex; special version for IDS
Grappler+Serial CIRCLE 213 ON READER SERVICE CARD	Orange Micro, Inc. 1400 N. Lakeview Avenue Anaheim, CA 92807 (714) 779-2772	Apple II, II+ or IIe	Set four DIP switches, install in slot, mount cable	Serial	Apple ImageWriter II
Microbuffer II+ CIRCLE 214 ON READER SERVICE CARD	Practical Peripherals, Inc. 31245 La Baya Drive Westlake Village, CA 91362 (818) 991-8200	Apple II, II+ or IIe	Set five DIP switches, mount cables, install in slot	Either	Apple, Epson, NEC, C.Itoh, Anadex, IDS, Okidata
PKASO/U CIRCLE 215 ON READER SERVICE CARD	Interactive Structures, Inc. 218 Great Valley Parkway Malvern, PA 19355 (215) 644-8877	Apple II, II+ or IIe	Set jumper, install in slot, run configuration software, reset jumper, reinstall in slot	Parallel	Apple, Epson, NEC, Okidata, Anadex, MPI, Sta Panasonic, Centronics, Facit
Uniprint CIRCLE 216 ON READER SERVICE CARD	Videx Inc. 1105 N.E. Circle Boulevard Corvallis, OR 97330 (503) 758-0521	Apple II, II+ or IIe	Set nine DIP switches, attach cable, install in slot	Parallel	Apple, Epson, NEC, Okidata, Anadex, Centronics, IDS
Live Wire CIRCLE 217 ON READER SERVICE CARD	Street Electronics Corporation 1140 Mark Avenue Carpinteria, CA 93013 (805) 684-4593	Apple IIc	Plug into printer port	Parallel	Epson, IBM, C.Itoh, NEC, Okidata

A printer interface is a must for getting pictures out of your computer and on paper. If you own an Apple II, II+ or IIe, you probably know that a printer interface usually resides in slot 1—but beyond that, things get complicated.

Exactly what kind of interface you need depends on your printer. Some printers use a serial interface; others require a parallel interface (sometimes called a "Centronics-compatible" interface). Some can print

in color; some can print on extrawide paper; some can print in more than one type face. And each printer has its own collection of codes for printing graphics information.

Fortunately, most of the hard work involved in sorting out these questions has already been done by printer-interface manufacturers. Each interface listed in this table can perform hi-res screen dumps for one or more popular graphics printers—that is, it can print the picture

on your high-resolution screen on the printer. Most of the interfaces can also handle more complicated jobs—such as rotating the picture, expanding or shrinking it, or printing it in reverse.

As usual, before you buy any peripheral card for your Apple II, think about what you need—and be sure you carefully consider the price, how difficult it is to install, and how compatible it will be with your software and hardware.//

Double hi-res screen dump	Color screen dump	Buffer size	Special features	Type of manual	Price	Name
Yes	Yes	Optional 16K or 64K	Prints double hi-res in color; pull-down menus for configuration; 5-pin DIN connector			AlphaBits II
	Yes	Optional 16K or 64K	Prints double hi-res in color; pull-down menus for configuration; serial version uses 5-pin DIN connector; card also contains modem port and clock	82 pages, programming examples, clock utilities on disk	\$219.95 (serial) \$249.95 (parallel)	Business Card
No	No	None	Special ROM and cable for IDS printers	24 pages, programming examples	\$117	Dumpling-GX
No	No	None	Self test, formatting commands	50 pages, programming examples, driver routines	\$99	GraphiCard
No	IDS version only	Optional 16K, 32K or 64K	Apple III compatible	25 pages, programming examples	\$119	Grappler+
Yes	Yes	Optional 16K, 32K or 64K	Formatting commands; DB-25 connector	28 pages, programming examples	\$119	Grappler+Serial
No	No	16K; optional 32K or 64K	Self test, formatting commands	65 pages, programming examples, driver routines	\$199	Microbuffer II+
No	No	Optional	Special character fonts, large-scale graphics utilities	176 pages, programming examples, utilities on disk	\$175	PKASO/U
Yes	IDS Prism only	None	Formatting commands, triple-size graphics printing	48 pages, programming examples	\$89	Uniprint
Yes	No	None	Serial-to-parallel converter; pull-down menus for configuration	20 pages, utilities on disk	\$49.95	Live Wire

JUNE / JULY 1986

Dazzle Draw

by STEPHEN VINCENT

DAZZLE DRAW
Broderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1700
Apple Ile, Ilc. Printers vary with particular package.
128K
\$59.95

CIRCLE 218 ON READER SERVICE CARD

Dazzle Draw, a product from Broderbund's Creative Workshop Series, is quite simply the Cadillac of graphic and paint programs. Supported by Apple's extended 80-column card, its double high resolution colors, the palette of which includes 16 solids and 30 variant woven patterns, are remarkably lush. But, the system's graphic options are so technically simple that a seven year old can easily master them.

To fully operate Dazzle Draw you need either a mouse or graphics tablet. You can print out the images on a variety of black and white printers or, ideally, in full color on the new Imagewriter II with its 4-color ribbon. (When buying Dazzle Draw, make sure to check that the equipment specifics listed on the package correspond to your own equipment requirements.)

Unlike many other paint programs, where the menu options and color choices are separately accessed, during which time you are blind to your image-in-progress, this program's editing, brushstroke and color

options are easily available through on-screen menu windows.

Pull down options include "Spray Paint," which uses dots to enrich a drawing's texture and color, and "Text," which offers two type fonts—in plain, bold, or italic—of varying sizes.

Dazzle Draw is an easy-tolearn, exceptionally effective paint program. The reviewer recommends more information on artistic techniques to enhance the program's use.

"Capture" options allow you to eliminate, reposition, or multiply sections of your image. You can "flip" sections vertically or horizontally. There is also "Zoom" and a variety of K-line, ray, circle, box and mirror functions.



Most special about Dazzle Draw is the physical fluidity with which you can draw and almost simultaneously make tool, editing and color choices. However, one of the drawbacks of having the menus on the screen is that the drawing area extends behind both top and bottom

window borders. You must use a scroll bar, on the lower menu, to push these blind areas into full view. Therefore, you never see the entire working image at once.

The Easy File system is the simplest way to save work to disk. ProDOS makes it possible to catalogue and replay drawings in more sophisticated ways, including a timed slide show. Black and white printouts can create a pleasing sense of the multiple textures (patterns) that can be juxtaposed within a single screen. If your primary intention is to create work for the color printer, it will take practice to find screen colors that match your printout expectations. Unfortunately, no matter how sophisticated and fast, we cannot expect the new Apple Imagewriter II color printer to brilliantly recreate Dazzle Draw's phosphorescent screen images using inked ribbon and computer paper.

Dazzle Draw and other refined computer graphic programs are clearly a wonderful contribution to the expanding potential of the personal computer. It is time, however, for the industry to take some responsibility for showing the public how this graphic and text capability can be incorporated into work, school and home. Perhaps publishers working with artists could develop workbooks that introduce users to artistic techniques or that demonstrate ways to make cards, letterheads and books with the printer.

Dazzle Draw brings us to the brink of such wonderful uses. However, unless its capabilities are presented in concrete terms, I am afraid that Dazzle Draw will remain a temporary infatuation without a future.//

Stephen Vincent has recently authored two writing programs for Sunburst Communications, I Can Write (second grade) and Be a Writer (third grade), designed to work with Sunburst's Magic Slate word-processing program.

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Mouse Write

by VAL J. GOLDING

MouseWrite (new version) Roger Wagner Publishing, Inc. P.O. Box 582 Santee, CA 92071 (619) 562-3670 Ilc, Ile with 128K \$149.95

CIRCLE 219 ON READER SERVICE CARD

Here is a product for Apple II users who have dreamed of serious mouse-based word processing. Steve Cochard's **MouseWrite** from Roger Wagner Publishing is a full-featured, mouse-and-window-oriented word processor. First released in 1985, MouseWrite was a pioneer.

The program uses standard mouse techniques; if you have ever used pull-down menus and multiple, movable windows, you will feel right at home.

MouseWrite offers a software clock for the IIc, and recognizes and uses hardware clocks in the IIc and IIe. Other features such as adjustable margins, find and replace, headers and footers, left, right and center justify, and hanging paragraphs, are part of the package.

Perhaps you've asked, "Why use a mouse with a primarily keyboard-oriented word processor?" Consider corrections: the mouse whisks the cursor from one position to another. Apply this process to other areas and you see that a mouse-based word processor is fun and efficient.

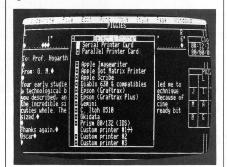
Its cut and paste and clipboard features make MouseWrite shine; with the multiple open window capacity, you may cut from one and paste to another. You can also use one window as a scratch pad, or as a ruler for tab settings.

MouseWrite is ProDOS-based: it saves and loads files faster. The file menu allows a document to be saved as a Mousewrite, ASCII text, or "word processor" file.

A few features could be improved. MouseWrite specifies printer format parameters in inches of width or depth. For printers adjusted for lines per page or characters per line, you must calculate by trial and error.

MouseWrite is a moderatelypriced word processor with Mac-like ease-of-use and a rich assortment of word processing features.

Every now and then the cursor appears to vanish; this is not a bug, we are told, but rather an indication that some piece of text has been selected and not disposed of. A MouseWrite file can support 16 pages of single-spaced text; files can be linked



together.

While the manual is generally well-written with an excellent tutorial, both the index and overall

organization suffer a bit. For the newcomer to the world of mice, the manual doesn't adequately introduce important concepts until the glossary, although to its credit, the tutorial leads you through each of the MouseWrite sub-menus and commands.

Nevertheless, MouseWrite represents a genuine advance in the field of low-priced word processors. With its many features it is difficult to imagine even more, yet this is exactly what Cochard has done—added enhancements. The new version should be available by the time you read this review.

Considerable planning has gone into the new version, but some complexities exist. To provide memory for the additional code, MouseWrite has gone to an overlay system, which means more disk input/output, thus more disk swapping. This overlaying memory, however, makes possible two major enhancements: an online spelling checker and a collection of MouseWrite Desktop Accessories. With a hard drive or UniDisk 3.5, these additions present no problem.

Accessories include a print buffer (with a RAM card), formatting a new disk while a document is open, a minimal telecommunications facility, direct access to BASIC while a document is open, capability to load a DOS 3.3 text file and the facility to add your own accessories.

Enhancements to the main module include footnoting ability, case conversion for selected text, expansion of styles menu to cover color printers, opening multiple documents when a RAM card is available, downloading of custom fonts for those printers with that capability, an easy to use mail merge and file merge and glossary files.//

Val J. Golding is the editor of On Three, a magazine about the Apple III. He lives in Southern California.

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DESIGN YOUR OWN HOME Avant-Garde Publishing Corp. 38 Commercial Blvd. Novato, CA 94947 (415) 883-8083 48K \$49.94 each

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Design Your Own Home, which consists of three separately packaged programs—Architecture, Landscape and Interiors—claims it can allow you "to create quick, precise architectural, landscape or interior plans, to turn the plan in your head into the plan on paper."

Many Apple users will be drawn to this kind of software for the illusion it creates: that it enables you to do something only experts could formerly accomplish. For people who like do-it-yourself projects, these programs possess immediate appeal. The programs assume you have a plan in mind, however. They do not design—they provide you the tools.

The programs' designers have unwittingly provided a preview so you can decide quickly if the software is for you. There are clear, easily accessed examples of finished products. In the Architecture program, they are labeled house, house 2 and deck house. The Landscape program shows a finished landscaped house from several viewpoints. Before you buy, ask to boot either the Architecture or Landscape disk, turn in the manual to page 7

for Landscape or page 12 for Architecture and look at the examples. Ask yourself if a \$2 pencil and scale rule would do the same for you. The computer is another pen and pencil, initially more difficult to use, and ultimately no more helpful in design. Copying the examples in the programs is no different from copying a picture out of a book.

The manual says you can manipulate these programs with a joystick, but I found it nearly impossible to hold the cursor steady. My joystick is on spring tension, so it always

With these programs you'll begin to understand design plans. You'll still need professional help, however.

returns the cursor to center; I had to hold the joystick under tension with one hand while striking the appropriate key with the other hand to implement the line. You should probably use a mouse to make accurate line drawings. Diagonal lines will always look rough, a problem caused by pixel spacing.

Nevertheless, some visually tantalizing graphics are available at a mere keystroke. Trees pop out and move around with ease, shrubs appear along brick walkways and bathtubs and sinks are rotated into place. (Admittedly, the trees and shrubs are a little weird looking and

the oblique lines for border or wall definition have that unique computer look.)

Construction details have to be drawn by a professional. Could a professional have taken a simple pencil drawing by you and converted it to a set of working drawings? For those who don't understand scale, it is built into the plan; if you don't know what a bathtub looks like in plan view, it is provided with a keystroke; if you don't know what a fullgrown elm tree looks like, take my word for it-you won't know after seeing it on the screen. Almost all computer trees drawn by these programs look the same; you are going to have to read the labels.

These programs can give substance to your ideas as long as they are simple. You do need to spend several hours to master the technique. No, I don't foresee a continuing use after you've accomplished one house or one landscape layout of a simple personal nature. There appears limited adaptability beyond the initial simple plan stage. Building professionals may find a use for these as sketchpads for clients to illustrate simple initial ideas. For the landscape program, a color monitor would enhance the designer's layout on the screen.

This set of programs will allow those of you who have never read plans to begin to understand them. And they may inspire you to explore building more fully.//

Alec Lambie is a general contractor and building designer whose business is run on an Apple computer.

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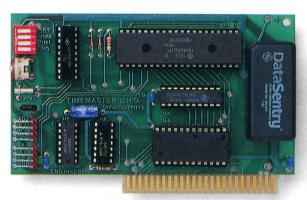
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There's an abundance of graphics products and tools on the market and we list many of them here—over fifty, in fact—for you. Some of the products are new, others are proven hits. All can add to your computer graphics pleasure. Let us know if we've inadvertently missed a worthwhile product.

continued on page 90

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It's called a *lightstick*. At first glance, it looks like nothing more than a vertical array of blinking red LEDs (light emitting diodes) that form a three- to six-foot high column of light flashing against a black background.

The LEDs are flashing thousands of times every second, so fast that the column appears to be just a vertical red light that's flickering a bit. But as visitors to Disneyland's Videopolis and San Francisco's Exploratorium have discovered, there's a lot more to that flickering

hundreds of LEDs is individually controlled, flashing on and off in accordance with patterns stored in the lightstick's memory. Each fraction of a second, the LEDs flash a very narrow vertical slice of the picture—like one column on a computer's screen. It's impossible to tell what a picture is if you just see one column at a time. But as your eye scans quickly across the flashing lightstick, your persistence of vision holds onto each slice, and what you see is a complete image—even

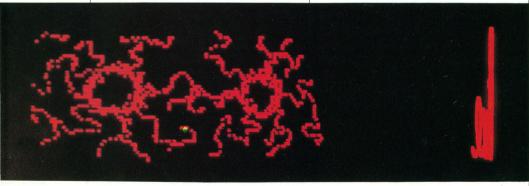
you can't see the images just by looking at the lightstick.

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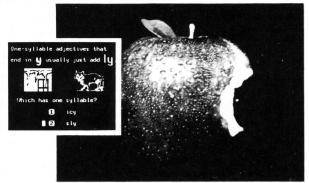
The images look something like bright red hi-res graphics pictures, and they're formed in the same way as a picture on your Apple's highresolution screen: Each of the though the whole picture never really appears at one time.

Bill Bell, the Boston designer who created the lightstick, calls the images "saccadoscoptics." To work, they depend on several things. One is very bright LEDs flashing very fast (some lightsticks have more than one LED for each horizontal row of the column, to make the image brighter). Another essential is a dark background. A third is rapid eye movement and peripheral vision—

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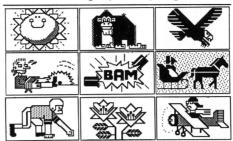
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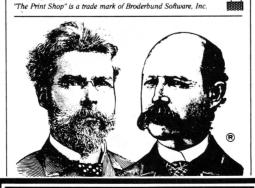
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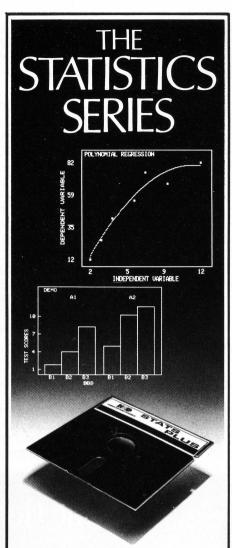
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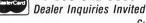
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Synergistic Software 830 N. Riverside Drive, Suite 201 Renton, WA 98055 (206) 226-3216 \$34.95

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Fingertips is an integrated software package that runs on any Apple II, II +, IIe or IIc. It can run in background mode with ProDOS or 128K DOS 3.3, and lets you use a notepad, calculator, calendar, phone directory, telecommunications program and disk commands—all without disturbing your currently running program. You can also run Fingertips separately on systems without 128K, and the program is designed to be compatible with a wide variety of disk drives, modems and peripheral cards.

UNDERSTANDING (Series)

Howard W. Sams & Company 4300 W. 62nd Street Indianapolis, IN 46268 800-428-7267 \$14.95 each

CIRCLE 286 ON READER SERVICE CARD

The 12 books in the **Understanding** series are designed to make technical subjects easy to understand.

Each book contains colorful illustrations and marginal notes; they're ideal as self-teaching guides. Titles include Understanding Computer Science, Understanding Artificial Intelligence, Understanding Microprocessors, Understanding Data Communications and Understanding Digital Electronics. Sams also offers the Basic Electricity Series, covering Basic Electricity and DC Circuits, Basic AC Circuits and Basic Electronics Technology.



WORLD'S GREATEST BASEBALL GAME

Epyx, Inc. 1043 Kiel Court Sunnyvale, CA 94089 (408) 745-0700 \$34.95

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The World's Greatest Baseball Game lets you create and manage your own All Star team, and match it against some of the great teams in baseball history. This new version features more than 75 teams to choose from, the complete rosters from the 1984 and 1985 seasons and statistics for selected former All Star and World Series teams. You can play against an opponent or the computer, trade players, control field action and save your favorite teams for future use.

NEW PRODUCTS

QUADJET INK JET COLOR PRINTER

Quadram Corporation One Quad Way Norcross, GA 30093 (404) 923-6666 \$495

CIRCLE 288 ON READER SERVICE CARD

The **Quadram Quadjet** printer offers seven colors and the quietness of ink jet technology. It prints text at 37 characters per second, but the real

appeal is bit-plot graphics: up to 640 graphics dots per line, printing at up to 2600 dots per second. The Quadjet uses an 8-bit parallel printer interface to connect to any Apple II; Apple graphics software can be ordered separately from Quadram.

IMAGEWORKS

Redshift 101 First Street, Suite 185 Los Altos, CA 94022 (415) 322-7373 \$195

CIRCLE 226 ON READER SERVICE CARD

ImageWorks is a low-cost high-resolution graphics display for the Apple II+ and

He that displays a full 256-by-256 or 256-by-192 resolution screen overlaid on the Apple's regular text or graphics screen. Each dot on the ImageWorks screen has one of 256 different grey levels; as a result, ImageWorks can display digitized pictures with photographic realism and clarity far beyond that of ordinary high-resolution graphics. Supplied software allows loading and saving pictures, as well as filtering, equalization and other functions for video processing. A digitizer and a color adapter are also available for \$95 each.

LIFETIME LEARNING LIBRARY

Learning Technologies, Inc. 4255 LBJ Freeway, Suite 131 Dallas, TX 75244 800-238-4277 (214) 991-4958 (in Texas) \$19.95 each

CIRCLE 282 ON READER SERVICE CARD

Learning Technologies' Lifetime Learning Library is a series of educational software designed for students from preschool to grade 6. The 20 programs cover Reading Readiness, Math Concepts and Problem Solving, with titles such as Math in a Nutshell, Shutterbug's

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Lifetime Learning Library

Pictures and Scrambled Eggs. Each program in the series uses sound and hi-res graphics, and runs on any Apple II, IIe or IIc; each also comes with a free Classroom Kit for teachers.

KALEIDESCOPE II

Telemax, Inc. 780 Lorraine Drive, Box 339 Warrington, PA 18976 (215) 343-3000 \$199

CIRCLE 290 ON READERS SERVICE CARD

The **Kaleidescope II** is a plug-in card that lets you use an RBG monitor with your Apple II, II+ or IIe. In addition to the sharpness of an RGB picture, each line on the 40-or 80-column text page can be dis-

played with one of eight different foreground and background colors. Telemax also makes the **Peacock** RGB interface for the Apple IIc, which plugs into the video expansion port on the IIc's back.

APOLLO ACCOUNTANT

Schmidt Enterprises 7448 Newcastle Avenue Reseda, CA 91335 800-232-6777

(818) 342-5930 (in California) —— \$120

CIRCLE 281 ON READER SERVICE CARD

The Apollo Accountant is an accounting system for home or business that runs on the Apple II, II+, IIe or IIc. It offers an unlimited number of transactions, accounts and categories; up to 4000 transactions will fit on a single disk. According to the publisher, you can instantly retrieve, print or remove any transaction or group of transactions, and each function can be activated with a single key press.

DONALD DUCK'S

PLAYGROUND

Sierra On-Line, Inc. Coarsegold, CA 93614 (209) 683-6858 \$29.95

CIRCLE 284 ON READER SERVICE CARD

Donald Duck's Playground introduces children ages 7 to 11 to problem solving and logical thinking. The object of the game is to help Donald build a playground for his nephews: first Donald earns money by sorting produce, toys and airline baggage; then he must buy equipment and arrange it at the playground. The game runs on any Apple II with 64K and a joystick.//

MARY RHOMBERG LAVERY

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FROM II COMPUTING

Name: (Mr./Mrs./Ms)						
Address:							
City:	State: Zip:						
Telephone: ()							
A. What kind of comp							mb orn
2. ☐ Apple II + 5 3. ☐ Apple IIe 6	. ☐ Apple IIc . ☐ Apple Compatible . ☐ Other	1 2	6 7	11 12	16 17	21 22	151 152
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	e 8. □ Softstrip reader	29	34	39	44	49	179

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4. ☐ Spreadsheets	cations
5. Programming	9. ☐ Graphics

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E. Household Income

1. □Less than \$25,000	4. \$_\$50,000-74,999
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3. \$35.000-49.999	6. □ \$100.00 and ove

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Reader Service Card FREE PRODUCT INFORMATION FROM II COMPUTING

Name: (Mr./Mrs./Ms)		
Address:		
City:	State: Zip:	
Telephone. (

A.	What kind of cor	nputer do you own?	
	1. Apple II	4. ☐ Apple IIc	
	2. ☐ Apple II+	5. ☐ Apple Compatible	
	3. ☐ Apple IIe	6. Other	_

B. What products do you plan to buy in the next 6 months? 1 Drinter ← □ Memory

I. L. Frinter	o. in Memory
2. ☐ Modem	expansion boards
3. Color monitor	7. ☐ New Apple
4 I UniDisk 3.5	Computer

	CIALD TORE J. J		Compacer
5.□	Hard disk drive	8. 🗆	Softstrip reader

C. What are the primary	uses of your computer?
 □ Word processing 	6. ☐ Running a
2 Education	business

3. 🗆	Games and	7. Data bases				
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3 35 000-49 999	6 □\$100 00 and over

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